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FLIGHT

AIRCRAFT, SPACECRAFT, MISSILES

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A Tale of Two Cities

THE London-Paris race sponsored by the *Daily Mail* is surely the most stirring event of its kind since that great Frenchman Jules Verne sent that great Englishman Phileas Fogg strutting and scheming round the world in you know what. (And it took a great American, the late Mike Todd, to think up the balloon sequence. Verne never did.)

The *Daily Mail* race is exciting in more than the sensory definition, for it promises to stimulate inter-city travel both in precept and practice, just as the MacRobertson Race of 1934 stimulated air transport in the global sense. Never since that memorable contest has there been quite such a quickening of beat in aviation circles, such a healthy rash of schemes and notions, or such an animated buzzing at the bar. The game's afoot, and the midsummer days will be seeing some matchless deeds attempted, dared and done.

The question of how to win is one of reconciling technical feasibility with practical possibility. The Fairey Rotodyne is one of the first means of locomotion to suggest itself, for it was conceived for just such a task; and we shall be surprised if Fairey do not manage to take the existing prototype across the Channel at something rather better than 200 m.p.h. Utilizing a relay of road vehicles, helicopters and subsonic jet aircraft the elapsed time could evidently be got down to a shade over the hour. This figure might be substantially reduced by at least two entirely workable, if difficult to arrange (and perhaps rather less comfortable), schemes. But until we hear these schemes proposed in the coming weeks—as we probably shall—we shall exercise the age-old editorial prerogative of saying nothing.

A Case for Cribbing

A NEW abbreviation that will increasingly be creeping into the airline vocabulary is i.f.c. In this case, fortunately, the initials sound sweeter than the tongue-twisting "inter-firm-comparison." This technique for method-improvement and cost-cutting is, of course, as old as industry itself: usually reliable sources have reported that our Lower Pleistocene ancestors employed it in improving the design of flint knives. What is new is the idea of developing a system for obtaining, processing and circulating data on an industrial basis. Underlying this development is the realization that everybody stands to gain from a widespread dissemination of experience.

The main requirement here is a recording system that will produce comparative data. In the airline business the interchange of technical information is such that a recognizable language has evolved. But in the financial field no uniform system of airline accounting has yet been adopted. Hardly a single operator can be aware of the frustrations faced when trying to compare accounts. Yet this situation will continue as long as each company insists upon retaining its own form of presentation.

The International Civil Aviation Organization has already suggested a standard layout for the three main accounts—the operating account, the profit-and-loss account and the balance sheet. It would set the industry a fine example if those who are at this moment drawing up the annual reports for B.E.A. and B.O.A.C. were to think seriously about reshaping the corporations' accounts into a form that others would be glad to imitate.

OVER TO YOU, SIR: Sir George Edwards (right) hands over documents of the 400th Viscount to Mr. P. Ll. Hunting, chairman of Hunting-Clan (news item, col. 1). Looking on (l. to r.) are Mr. J. L. Smith, managing director of Field Aircraft Services, Mr. M. H. Curtis, managing director of Hunting-Clan Air Transport Ltd., and the Hon. Anthony Cayzer, deputy chairman, British and Commonwealth Shipping

FROM ALL QUARTERS

Four Hundred Viscounts

AS recorded in our "Air Commerce" pages last week, the 400th production Viscount was handed over by Sir George Edwards, managing director of Vickers-Armstrongs (Aircraft) Ltd., to Mr. P. Llewellyn Hunting, chairman of the Hunting Group of Companies, at a ceremony at Wisley Airfield on May 29 (picture on this page).

Sir George recalled occasions in the Viscount's history when 400 production machines looked "a jolly long way away." He would not forecast 500; but he would not be at all surprised if Vickers built them.

Mr. Hunting said that he was sorry that Hunting-Clan could not give more orders, but as long as the present restrictive Civil Aviation Act remained on the statute books and the so-called Independent was prevented from operating, he thought this unlikely. Mr. Hunting went on "Lift the lid so that we can see the rabbit, and I see no reason why we should not give the industry more orders. I reckon the whole industry is drifting. We have only got to go on as we are doing for another ten years and we will find the foreigner doing our air transport for us . . .

"Being a shipowner, I am not very popular in certain quarters when I say that the air, in some of its functions, has overtaken the ships, and will continue to do so in the very near future. Air freight is only just starting. God help the ship when it gets into its stride. Transport . . . is administered in this country by one Ministry. There is one Minister of Transport, for whom I have a great deal of respect and sympathy. He has 24 hours in the day—no more, no less. I wonder how much of his time he gives to Aviation, or even can give—ten per cent? Your guess, Sir, is as good as mine. I would like to see a Minister of State in charge of Civil Aviation but within the Ministry of Transport."

RUSSIAN PANORAMA: A Yak-24 twin-engined helicopter hovers over the River Neva at Leningrad, carrying a special camera rig. The official Soviet caption reads: "The helicopter is being used in the shooting of the first film for the all-round-view cinema." Compared with the Yak-24 shown in our special "Helicopters of the World" issue (May 15) this example has a modified tail

The "Daily Mail" Race

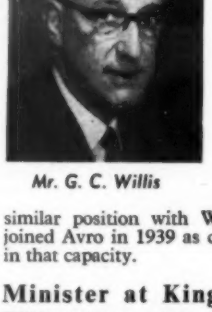
THE following supplementary regulation is issued in respect of the *Daily Mail* London-Paris race (editorial in this issue): "*The importance of adequate insurance is stressed* and the Stewards' right at their absolute discretion to refuse any application from an entrant to compete includes cases in which in their opinion adequate insurances in all respects have not been taken out for all purposes of the race. In exercising this discretion in no way do the Stewards warrant that any insurances taken out are adequate."

Proud April

AN increasing contribution to Great Britain's engineering exports is being made by the aircraft industry. During the first four months of this year, aviation products accounted for 11.9 per cent of the total engineering exports. Comparative percentages were 11 per cent during 1958, 8.6 per cent in 1957, 8.2 in 1956, 5.9 in 1955 and 5.5 per cent in 1954.

During the first four months of this year the aircraft industry exported almost £60m worth of goods. The April figure, £17,335,559, was the second highest monthly total ever achieved. The aircraft and parts total, £11,258,283, was the second highest ever recorded; and the figure for aero-engines, £5,417,506, constituted a record. Leading buyers of aircraft and parts during April were India (£2,182,113), West Germany (£1,832,468) and Canada (£1,304,699).

Avro's New Secretary



Mr. G. C. Willis

AN announcement was made last week that Mr. G. C. Willis has been appointed company secretary to A. V. Roe & Co. Ltd. with effect from May 28. Mr. Willis takes over this position from Mr. S. G. Joy, who was appointed general manager in March. The position of chief accountant, vacated by Mr. Willis, will be taken over by Mr. R. Fitch.

Mr. Willis was born in 1906, and between 1923 and 1930 served articles with J. B. Boyd, Wrigley & Co. of Manchester. From 1930 to 1934 he was a chartered accountant with Bertram Silcock & Co., Warrington, and between 1934 and 1939 held a similar position with Walton, Watts & Co., Manchester. He joined Avro in 1939 as chief accountant and served for 20 years in that capacity.

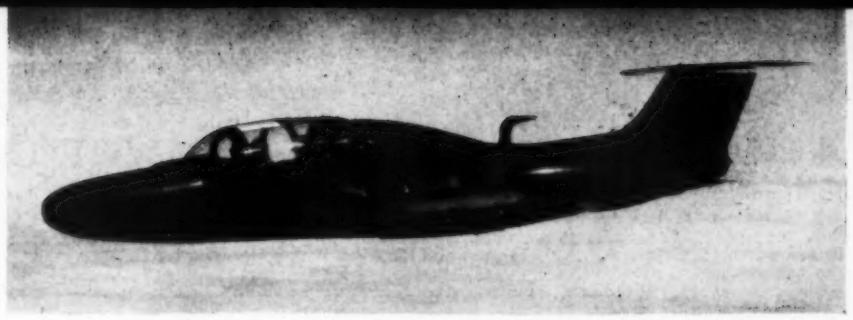
Minister at Kingston

THE Minister of Supply, Mr. Aubrey Jones, accompanied by his Deputy Secretary (C), Mr. D. W. G. L. Haviland, and Chief Scientist, Sir Owen Wansbrough-Jones, on Friday visited the headquarters of the Hawker Siddeley Group and Hawker Siddeley Aviation Ltd. at Kingston-on-Thames.

The Minister and his party also inspected the design, research and production facilities and projects of Hawker Aircraft at Kingston. Afterwards they visited Hawker Siddeley Aviation's research establishment at Chertsey, Surrey.

Folland Visitor

A VISIT was paid to Folland Aircraft Ltd. on May 25 by Air Marshal Sir Hugh Constantine, recently appointed Air Officer Commanding-in-Chief, Flying Training Command. Sir Hugh discussed Gnat Trainer progress with Mr. W. E. W. Petter, managing director and chief engineer, and with Air Marshal Sir Richard Atcherley, who was Sir Hugh's predecessor in Flying Training Command, and who is now with Folland as sales director. Sir Hugh also visited Folland's flight development unit at Chilbolton.



GAY PARIS: Now working hard again after receiving the test instrumentation described in "Flight" for May 22, Cranfield's Morane Paris, registered G-APRU, is the eighth built and is painted pale blue. It is fast, pressurized, twin-engined, very economical and delightful to fly

Air Ministry and M.o.S. Appointments

THE appointment is announced of Mr. M. B. Morgan, C.B., M.A., F.R.Ae.S., as Scientific Adviser to the Air Ministry. At present Deputy Director (Air) of the Royal Aircraft Establishment, he will take up his new post shortly.

Mr. Morgan joined the R.A.E. after leaving Cambridge University in 1935 and now holds the rank of chief scientific officer. From 1935 to 1948 he was in the Aero Flight Section, dealing with flight testing and investigations into aerodynamics. He was Head of the Guided Weapons Department until 1954, when he became one of the two Deputy Directors.

Appointed Deputy Director (Air) at the R.A.E. in succession to Mr. Morgan is Mr. Handel Davies, at present Director-General of Scientific Research (Air). Mr. L. F. Nicholson, at present Head of the Aerodynamics Department, will succeed Mr. Davies in the post he is vacating.

A.W.A. Takes Over Gloster Division

THE Technical Developments Division of the Gloster Aircraft Company will be taken over by Sir W. G. Armstrong Whitworth Aircraft Ltd. from June 1. Gloster T.D.D. will continue to manufacture their existing range of products, which includes various forms of valves, hydraulic and electronic equipment, and will also assist in the production of items from A.W.A.'s fast-expanding commercial electronic department. The takeover will bring together two departments producing a complementary range of equipment with a wide application in the fields of instrumentation, automation and radio communication as well as aircraft and guided missile systems as a whole. Gloster T.D.D. and A.W.A. are both members of Hawker Siddeley Aviation Limited.

Mr. E. W. Absolon, who has been chief engineer at T.D.D., has been appointed manager of the new division. Mr. A. E. Martin, who has been in charge of A.W.A. Commercial Electronics Department, will move to Gloucester as deputy divisional manager. The sales and marketing of products from both the Gloucester and Coventry factories will be the responsibility of Gloster T.D.D. under the T.D.D. sales manager, Mr. P. Emmett.

F.A.I. Conference

AT the annual conference of the F.A.I., held this year in Moscow, Miss Jacqueline Cochran (U.S.A.) was unanimously re-elected president. After flying her own aircraft to Moscow she presented Academician Andrei Tupolev, the doyen of Soviet designers, with the Federation's Gold Medal.

During the three-day meeting the Conference accepted the invitation of the National Spanish Aero Club to hold its 53rd Conference in Barcelona next year. It also agreed to a French proposal to take part in the celebration next month to mark the 50th Anniversary of the cross-Channel flight of M. Blériot, and approved a proposal by Miss Cochran to "examine the possibility of forming a Foundation Fund with the aim of broadening the activities of the Federation, providing headquarters in Paris and aiding aviation in under-developed countries."

IN BRIEF

The first tests of the Saunders-Roe SRN.1 Hovercraft (*Flight*, April 24) took place at Cowes last week-end. Screens have been erected around the test area.

It is stated by *Aviation Week* that Allison are likely to licence-produce Rolls-Royce transport engines. The RB.141 is specifically named, although Douglas are known to be interested in the smaller RB.140.

APPOINTMENTS: of Mr. E. W. Absolon (left) and Mr. A. E. Martin are announced on this page ("A.W.A. Takes Over Gloster Division", above)

Mr. Thomas V. Jones, formerly a senior vice-president of Northrop Corporation, has been elected president of the company. He succeeds Mr. Whitley C. Collins, who died recently.

The Welsh International Air Rally will be held at Cardiff (Rhoose) Airport during the June 13-14 weekend. Organized by Glamorgan Flying Club, the programme will include a flying display and air race on June 13.

R.A.F. Colerne, Wilts, were honoured on May 29 by a visit from the Duchess of Kent. Before leaving in a Heron of the Queen's Flight Her Royal Highness watched demonstrations by Britannia, Beverley, Hastings and Pioneer aircraft, and parachute jumps from a balloon.

A long-rumoured agreement between Pratt & Whitney Aircraft and SNECMA for licence-manufacture of the J75 has been formally announced. The engines will be employed in production Mirage IVs. SNECMA will also manufacture and sell commercial JT-4s.

New data have been recently released for two bombers of the U.S. Air Force. Gross weight of the Boeing B-52G is given as 480,000 lb and the dimensions of the Convair B-58 as 56ft 10in span, 96ft 9in length and 31ft 5in height. Performance figures released for the B-58 include a service ceiling of over 50,000ft and a maximum speed in the region of 1,300 m.p.h.

The British pilot Philip Wills was declared winner of the Netherlands Gliding Championships at Terlet, near Arnhem, on Sunday last, with 7,706 points out of a possible maximum 8,000.

Eleven engineers formerly employed by Avro Aircraft said last week in Toronto that they hoped to finish the prototype of "a small and economical VTOL machine" by the end of September.

A.V-M. G. A. Walker, A.O.C. No. 1 Group, Bomber Command—and shortly to be Chief Information Officer at the Air Ministry—visited Avro's plants at Woodford and Chadderton on June 1.

Late last month the Grumman S2F-3 Tracker made its first flight. It incorporates more advanced ASW systems, and may lead to a new version powered by Allison T61 engines.

On May 29 a Hastings of R.A.F. Transport Command crashed and burned near Khartoum, en route from Aden to Britain. Five members of the crew of six were killed, and four of the 26 passengers were seriously injured.

On May 28 some 60 officers from SHAPE, representatives of NATO, Commonwealth and other European countries, attended a demonstration of the British 2in spin-stabilized rocket projectile system, held at the A. & A.E.E., Boscombe Down, Wilts. The display, sponsored by the M.o.S. and Microcell Ltd. (makers of the launching equipment), included air firings from Hunter, Canberra and Sea Vixen aircraft.

On May 19 Moscow radio reported that "the world's first two-stage rocket with transverse separation, fitted with a ramjet engine built by Igor Merkulov and launched on May 19, 1939, attained a height of 2,000 m and a speed of 220 m/sec." The report went on to describe other Merkulov projects, and claimed that on January 25, 1940, a pair of his ramjets were successfully flown on a piloted aircraft.

A Hiller 12C provided by Helicopter Sales Ltd. was employed recently by the Central Electricity Generating Board to transport two of its officials on an inspection of three of the Board's power stations. Flying from the Westland heliport at Battersea, they paid visits to Northfleet (Kent), Bradwell (Essex) and Little Barford (near St. Neots, Huntingdonshire).

This week's issue of our associated journal *Amateur Photographer* is a special Colour Number. It contains helpful articles on technical aspects, on photographing flowers and interiors, and on the holiday use of colour film. There are also full-colour reproductions of some of the world's finest camera studies.

Owing to printing difficulties over which we have no control, it is possible that this or succeeding issues of *Flight* may be delayed or reduced in size. Readers will, we know, bear with us.

AERODYNAMICS AT TEDDINGTON

THE current scope of the work of the National Physical Laboratory at Teddington was once again on show during the laboratory's Open Days last week. Some 4,000 visitors, it was estimated, inspected the 200 exhibits and discussed with the staff a variety of research topics.

The main interests of the aerodynamics division, largest of the specialized departments, were illustrated in a selection of well presented displays. These came under the four main headings of boundary layers and shear flows; aerodynamic design of swept wings for high cruising speeds; hypersonic flow research; and work on the use of slender wings for supersonic aircraft.

A set of oil-flow photographs on the wall of a laboratory in High-speed Laboratory B, and a model in the 25in × 20in transonic tunnel nearby, indicated that under the second of these headings the division had an active interest in the M-wing. The test programme on this model, with and without a nacelle, had in fact only recently begun: no detailed interpretation of the photographs had been made and significant results were not expected for about three months. The present phase was concerned with measuring lift, drag and pitching moment, and with investigating the flow pattern optically and by oil-film techniques. This will be followed by the measurement of rolling and pitching derivatives in a major study of oscillatory effects.

The cranked plan-form of the M-wing has recently attracted much attention from designers of supersonic aircraft, and is a feature of the Mach 1.2 airliner project designed by the Armstrong Whitworth company. Several advantages over the conventional straight swept-back wing are claimed for it: structural problems may be easier; the engines can be installed conveniently in the kink; and the shape of the nacelles may be designed to influence favourably the flow over the whole wing, so reducing wing and nacelle drag. The changes in the position of the centre of pressure with aircraft speed or altitude may well be less for the M plan-form, and this would ease stability problems. During landing and take-off the wingtips are farther from the ground in the case of the M-wing and therefore the aircraft undercarriage can be shorter and lighter.

In the hypersonic field the N.P.L. facilities include one main shock-tube of 16in working section diameter and two smaller tubes, with an 8in "hot-shot" tunnel and a larger shock-tube now under construction. Since our report and illustration of the main shock-tube on the occasion of last year's Open Day, the design has been changed from straight-through type with plain divergent nozzle to reflection type using a convergent - divergent nozzle. A 10 cu ft extension to the tube has been added to effect a reduction in final pressure, and general development over the past year has been directed toward making the tube and its instrumentation more robust and easier to operate.

M-wing half-model, current subject of testing in the 25in × 20in transonic tunnel at the National Physical Laboratory

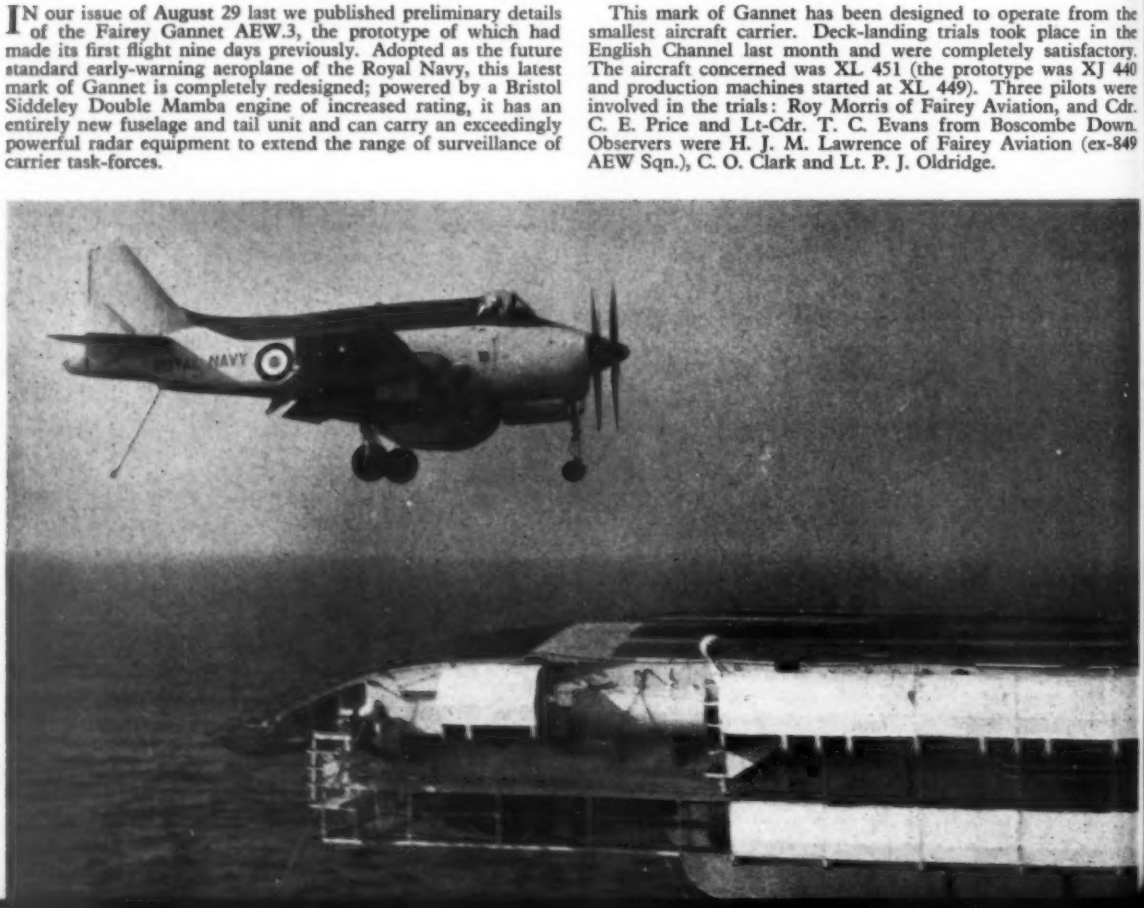
Investigations so far conducted with this tube have shown that it can produce "hot" hypersonic flow with a duration of 100 to 200 microseconds with stagnation temperatures of the order of 4,000 deg K. Shorter flow durations are obtainable up to 6,500 deg K. As the stagnation temperature is raised above this figure an electric-arc hot-shot becomes more attractive than the shock-tube, but the latter, with its "cleaner" flow, should remain useful for shock Mach numbers less than ten, i.e., in the stagnation temperature range from 1,500 to 6,500 deg K.

Work on the M-wing and in the shock-tube laboratory were only two of the many aspects of current N.P.L. activity on view. Among other items displayed were the results of investigations into tangential blowing for boundary-layer control; results of heat-transfer and surface-friction measurements in separated regions in supersonic flow; and the development of a remotely controlled probe in the exploration of three-dimensional vortex flow over wings. In the compressor house next to High-speed Laboratory B was installed the new 4,750 h.p. centrifugal compressor, used for supplying compressed air to the high speed wind tunnels, and a number of new vacuum pumps.

GANNET AEW CARRIER TRIALS

IN our issue of August 29 last we published preliminary details of the Fairey Gannet AEW.3, the prototype of which had made its first flight nine days previously. Adopted as the future standard early-warning aeroplane of the Royal Navy, this latest mark of Gannet is completely redesigned; powered by a Bristol Siddeley Double Mamba engine of increased rating, it has an entirely new fuselage and tail unit and can carry an exceedingly powerful radar equipment to extend the range of surveillance of carrier task-forces.

This mark of Gannet has been designed to operate from the smallest aircraft carrier. Deck-landing trials took place in the English Channel last month and were completely satisfactory. The aircraft concerned was XL 451 (the prototype was XJ 440 and production machines started at XL 449). Three pilots were involved in the trials: Roy Morris of Fairey Aviation, and Cdr. C. E. Price and Lt-Cdr. T. C. Evans from Boscombe Down. Observers were H. J. M. Lawrence of Fairey Aviation (ex-849 AEW Sqn.), C. O. Clark and Lt. P. J. Oldridge.



America's Defence Debates

ARMY, NAVY AND AIR FORCE AT VARIANCE

By DON ADAMS (New York)

ACCORDING to a recent article in *The New York Times*, six great problems—all connected with the defence of the United States—are currently being debated within the Pentagon. The problems are: (1) the concept of finite or infinite deterrence; (2) the possible assignment of the Navy's Polaris-missile submarines to the Strategic Air Command; (3) the allocation of funds to offensive or defensive purposes; (4) forces for limited warfare; (5) anti-submarine warfare; and (6) the organization of the Pentagon and the military services.

All are inter-related to a certain extent and each involves disputes and some bitter in-fighting among the various branches of service. At stake are not only the rôles of the Army, Navy and Air Force in America's future defence programme, but the security of the United States and hence of the entire Free World.

Finite or Infinite Deterrence? Two recent *Flight* articles (March 13 and April 3) have dealt with this question. Still under debate, the problem basically is an argument over what size of deterrent force is required to prevent the outbreak of another war. The U.S. Army and Navy generally support the concept of finite deterrence. Holding that America already has an extensive "overkill" capability, they argue that the peace can be maintained with a limited deterrent force whose size is determined by the task to be accomplished, and not by the size of the opposing enemy force. The presently contemplated ICBM/bomber force is sufficient for this purpose, the senior Services contend. Further, too much money is being spent for weapons which can be used only in all-out nuclear wars. And the allocation of additional funds to "massive retaliatory" weapons not only increases the overkill capability, but reduces the amount of money available for coping with limited wars. Particular criticism has been directed at the Air Force's procurement of the B-70 Valkyrie (Mach 3) bomber. Secretary of the Navy Thomas S. Gates recently called for "the elimination of certain of the very expensive mass-destruction single-purpose weapon systems which have a priority of claims against our national resources."

The Air Force, not unexpectedly, heatedly refutes these arguments and points to the fact that the policy of infinite deterrence (or counter-force strategy as they term it) has maintained the peace since the end of World War II. It believes that S.A.C. can and will be as potent a deterrent force in the era of ballistic missiles as it was in the days of the piston-powered B-36 bombers. Proudly pointed out by the Air Force is the fact that the B-36 force was never required to drop a single bomb in anger; but because it was available for retaliatory raids, the aggressor dared not attack. The B-36s fulfilled the primary Air Force goal of preventing war.

Believing thus that the U.S. must outnumber the Russians in offensive weapons, the Air Force advocates increases in appropriations for strategic weapons. Finite deterrence is an unrealistic policy, according to S.A.C.'s commander, General Thomas S. Power. He said recently: "Nobody knows what the minimum deterrent is. If anybody tells you they know what the minimum deterrent is, tell them for me that they are liars."

The Polaris Submarines. Long a source of friction between the Navy and Air Force has been the Navy's acquisition of a strategic missile—the Lockheed Polaris. Just as ICBMs were intended to replace the Air Force's bomber aircraft, the fleet ballistic missile was designed to give the Navy a weapon capable of taking over some of the missions formerly assigned to carrier-based aircraft. That the Navy should possess strategic attack systems has been debated for many years. Strategic attack is the primary rôle of S.A.C.; no other service should duplicate this function, the Air Force contends. Although the joint chiefs have generally supported this view, they have in the past tolerated the development of Army and Navy weapons capable of strategic strikes because such weapons heretofore had alternate capabilities for hitting tactical targets. Hence the development of the Navy's A3D and A3J was justified on the grounds that these aircraft could be utilized for either strategic or tactical missions. Evolution of the submarine-launched Polaris, however, represents a deviation from the principle that strategic bombardment is the function of S.A.C. Polaris is clearly a strategic weapon which is ill-suited to tactical usage. As such it should be under Air Force jurisdiction, S.A.C. argues.* And unless the Polaris submarines are controlled by the Air Force they probably could not be too efficiently employed in any major war, these same people state.

In refutation of this argument the Navy contends that the Polaris submarines can also be used in anti-submarine rôles. "Unthinkable" is the answer the Navy gives to the suggestion that they relinquish control of their prized weapon system.

The Cost of Offence v. Defence. The staggering increase in the cost of offensive weapons has been duplicated in the case of defensive arms. It has been reported that over $20,000 million has been spent so far on defence against manned enemy aircraft. Appreciable sums have been spent on ground-based, sea and airborne radar detection units, as well as for manned and unmanned interception systems. Has too much money been devoted to defence? Although earlier estimates had credited the Russians with a piloted bomber force at least as large as S.A.C.'s inventory, the most recent figures suggest that they possess no more than 150 heavy bombers of the Bear/Bison types. Production of the Bear turboprop aircraft has ceased entirely, while deliveries of the Bison have fallen to one per month. Counting the medium-ranged Badger bombers, the Russian force numbers fewer than 1,000 aircraft. Critics of America's heavy emphasis on defence spending point out that the money spent so far averages out to $20 million per Russian aircraft, or considerably in excess of the cost of the Soviet bombers themselves.

Both the Army and Navy believe that the Air Force's F-108 intercepter will further unbalance defensive spending. This weapon probably should be cancelled; alternatively, the Bomarc missile should be dropped. Countering these claims, the Air Force suggests cancellation of the Army Hercules anti-aircraft missile and the Navy's Talos, a similar-purpose weapon.

Forces for Limited War. Believing that continued over-emphasis on aerial defence and massive retaliation will increase the chances of limited war, the Army, with the support of the Marine Corps and Navy, advocates sweeping increases in appropriations for limited-war weapons. The Army would like to have more manpower and improved mobility, both on the surface and in the air. Reactivation of the massive Douglas C-132 troop-carrier project (*Flight*, February 22, 1957) has been suggested by some as a means of providing the Army with its required airlift. Others have requested permission for the ground service to build a helicopter with a large troop-carrying ability. The Army would also like to acquire its own ground-support aircraft; but under present restrictions they are not authorized to procure aircraft weighing more than 10,000 lb. The Navy would like to see additional appropriations for nuclear-powered super-carriers.

The Air Force disagrees with all the above policies.

Anti-Submarine Warfare. The Navy's contention that the Polaris system is a really potent weapon has backfired to a certain extent. Criticism has been directed at them by both the Army and Air Force because of what these services claim is too low a priority on anti-submarine warfare—a prime responsibility of the Navy. The Navy is acutely aware of the growing Russian submarine threat and has requested substantial increases in appropriations for defence against this undersea force. Some funds have been granted, but apparently these are insufficient. The Air Force has suggested that the Navy might obtain the needed money by reducing expenditures for carriers and strategic weapon systems.

Reorganization of the Services. Often mentioned is the proposal to merge all of the Services into a single branch, in one uniform. Duplication of effort could be eliminated with a concurrent saving in defence spending.

Another suggestion is that the Services be realigned on the basis of missions, rather than on the traditional grounds of "land," "sea" and "air." A possible arrangement would be: a *strategic* service, which would control all weapons capable of attacking strategic targets (S.A.C. and the Polaris submarines would fall under its jurisdiction); a *tactical* service, to be assigned the responsibility of meeting the enemy land forces in face-to-face combat (this force would include the Army, Marine Corps, Tactical Air Command and portions of the Navy's carrier fleet); a *defensive* service, with the responsibility for defending the continental U.S. from enemy aerial attacks (the Air Defense Command would come within this category, along with the Army's anti-aircraft units and portions of the Navy carrier force); a *logistics* service (including MATS and the Navy's transport corps); and *ancillary* services as required.

Some improvement might be effected by reorganizations of the above kind, but in time overlapping and new controversies might again rise. Debates are probably inevitable; but this is not necessarily a bad thing. A fundamental principle of the democratic system of government is that everyone is entitled to his own opinion; no dire consequences will result if these opinions contradict established policies. And, as a result of healthy debates, better solutions can usually be found to any problem.

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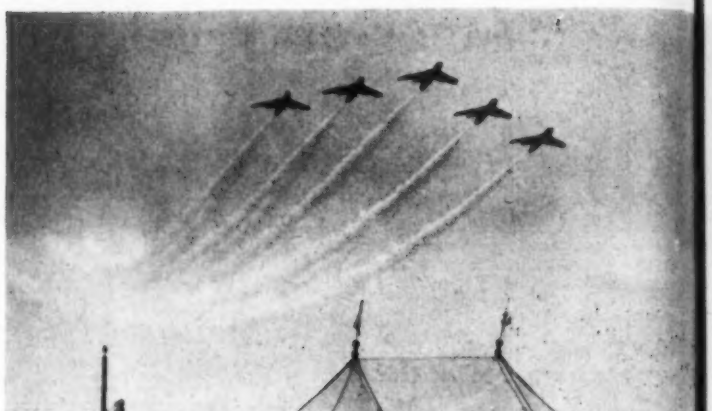
* *An anomaly is that while the Air Force claims (with good reason) that all strategic weapons should be under one Command, it is adamant in refusing to concede that the Tactical Air Command—whose mission is ground support—should be more closely allied with the Army.*

SHOREHAM'S BIG DAY

Opening of R.A.F.A. Air Week

"FLIGHT" PHOTOGRAPHS

AIR displays are tricky affairs to run, both for their actors and stage managers, at the best of times; and when the airfield concerned is a small grass one tucked into the edge of a town, and visibility goes down to about two miles in haze, the difficulties of production are intensified. Such were the circumstances at Shoreham Airport last Saturday, when the Royal Air Forces Association opened its Air Week in Brighton with an afternoon's flying programme containing 26 items. This was the advertised number, and the number given, for though two items did not come off as planned (a KB-29 tanker of the U.S.A.F. making its run-in on Lewes by mistake and a Whirlwind of the R.A.F. getting slightly damaged) there were two extra ones at the end. Full marks, then, for this 100 per cent score to all concerned: to the pilots and parachutists; and to the senior flying control officer, Mr. A. G. Down (who is now at Sywell but returned to Shoreham to take charge for the occasion), and his staff. Not only did the display go off as planned, but scheduled Doves of Channel Airways arrived and departed during the programme.



"Treble-One Squadron . . . showed that not even limited visibility can diminish the precision and dash of their splendid formation manœuvres"

Despite the atmospheric uncertainties of the afternoon, with its low cloud and haze keeping off the sun in a chilly and unfriendly way, a good crowd started to assemble around midday. By the time it had reached peak numbers, officials estimated that there were 40,000 there; and every man, woman and child was well rewarded for coming by an exhibition of piloting which reached the highest standards of skill. For the hazards which have already been mentioned meant that each performer had rather more to concentrate upon than his normal routine. First, to locate the small and probably unfamiliar airfield; then, to keep in contact with it during a demonstration at high speed in poor visibility; and all the time to work without the familiar guidance of concrete runways on which to line up. Special credit is due to the three types of V-bomber for putting in appearances. For crews used to working at altitudes of, say, forty or fifty thousand feet the low-level world is an unaccustomed one; but with Bomber Command precision the Vulcan, Victor and Valiant each made a majestic entry and exit at Shoreham.

With splendid spontaneity the U.S.A.F. pilot of a Super Sabre summed up the airfield on the R/T as he passed over it as "Just a dirt strip, I guess." Not entirely complimentary to a municipal airport, but a realistic appraisal from someone used to miles of military concrete. But over this "dirt strip" came a number of the fastest military aircraft in service today—Voodoos and a Destroyer as well as the Super Sabres, Hunters of both Fighter Command and the Danish Air Force, and Javelins. None of the American types did anything spectacular, and the four Javelins of No. 46 Sqn. confined themselves to slow and fast runs and a peel-off, though the power and shape of these aircraft always make a strong impression; but the Hunters all gave highly individualistic performances. F/L. I. F. Weston of No. 229 O.C.U. demonstrated the machine's solo aerobatic capability when in skilful hands; Treble-One Squadron, giving what they called their "flat" programme, showed that not even limited visibility can diminish the precision and dash of their splendid formation manœuvres; and four Hunters of the Danish Air Force gave neat proof of disciplined co-operation, especially in their line-astern flying.

Their presence at Shoreham helped to underline the agreeably international atmosphere of this R.A.F.A. display. It was opened by Prince Bernhard of the Netherlands, who arrived and departed piloting his own four-star Dakota; and amongst the items he watched was an admirable demonstration by 1st/Lt. A. J. de Wilde of the Royal Netherlands Air Force in a Fokker S.14 Mach-Trainer. This square-cut, rather solid-looking aircraft showed itself a graceful performer. The Dutch pilot began sensationally with a four-turn spin; then as one of his last manœuvres, before putting everything down and out for a slow fly-past, executed a beautiful stall turn.

With Prince Bernhard in the V.I.P. enclosure were three members of the Air Council—the Secretary of State for Air, Mr. George Ward; the Vice-Chief of the Air Staff, Air Marshal Sir Edmund Hudleston; and the Deputy C.A.S., Air Chief Marshal Sir Geoffrey Tuttle. There too were Marshal of the R.A.F. Lord Tedder, president of the R.A.F.A., and Air Chief Marshal Sir John Baker, president of the display committee. They must all surely have been pleased with the R.A.F. participation at Shoreham, for its variety and high quality.

It ranged in size from the V-bombers to a solo Chipmunk of Southampton University Air Squadron, flown with quite breath-taking agility by F/L. H. R. Lane; and as well as the Hunters it included a Canberra (of No. 50 Sqn., piloted by F/O. D. H. Bourne), a Beverley of No. 47 Sqn. (with F/L. R. D. Richards in command and A.T.C. cadets as passengers) and Vampires and Jet Provosts. There was also a most capable demonstration of STOL flying by a Pioneer of No. 230 Sqn. from Upavon, in the hands of the squadron C.O., S/L. W. J. Simpson. Vampires appeared twice on the programme, a team from 5 F.T.S. at Oakington under the leadership of F/L. M. E. Y. Holmes exhibiting a polished formation aerobatic routine, and F/L. D. F. Moffatt putting on a good-looking solo turn. As current holder of the Wright Jubilee Trophy

The band of No. 45F (Worthing) Squadron, Air Training Corps, was inspected by Prince Bernhard of the Netherlands, who opened the show

On the right, from the top, are the Hawks of 806 Sqn. with "everything down," the Avro 504K and the Hurricane v Spitfire dog-fight

(presented by the R.A.F.A. to the R.A.F. to commemorate the 50th anniversary of powered flight and competed for annually by R.A.F. instructors) he is a regular star at this season's displays; and it was interesting to see that on this occasion his Vampire was streaming a double plume of smoke. Regular performers this year, too, are F/L.s J. Rhind and P. J. Hirst of the Central Flying School with their synchronized Jet Provost aerobatics. It was a pity that on this occasion they came right at the end of the long programme (next to the last item) when many people had already started for home, for their show is an altogether outstanding one; though the gay red-and-white Jet Provosts are seen much more effectively under blue skies.

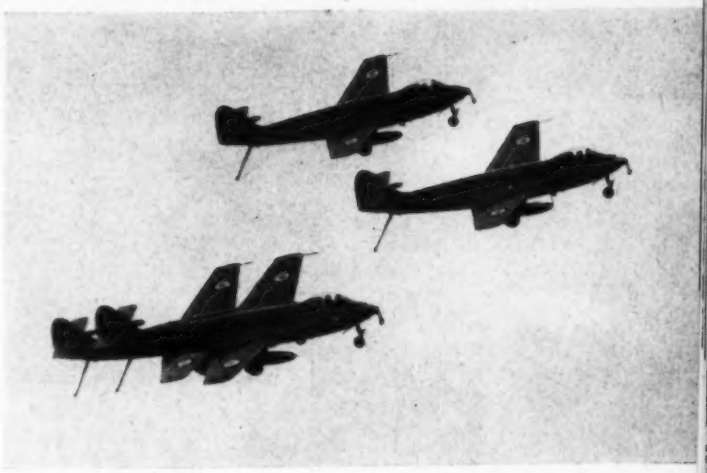
The very last item on the programme was a gliding display by Sgt. Andy Gough of the Wessex Gliding Club, who holds the British long-distance record and had come over from his R.A.F. unit in Germany specially to perform at Shoreham. This non-powered form of flight provided a good contrast to the general noise and speed of the afternoon, as did a combined delayed parachute drop (from a D.H. Beaver) by Mike Reilly and Malcolm Morris. This was especially well judged, Morris landing right in front of the V.I.P. enclosure to gain a well-deserved round of applause. Reilly came down almost on top of the yellow A.S.R. Whirlwind of No. 22 Sqn. and his canopy unfortunately caught one of its rotor blades, so that the machine was unable to perform later in the programme.

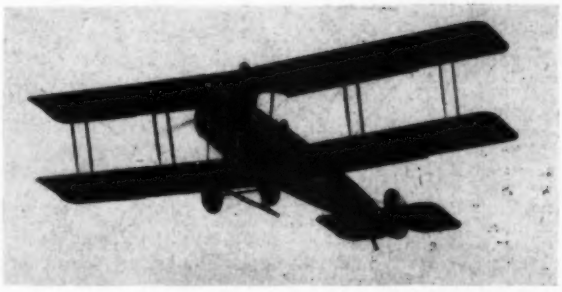
Among so many good things at Shoreham, however, the performances of the vintage aircraft and the Garland-Bianchi Linnet stand out as the most charming and memorable. This was partly because they were all flown by maestros of the piloting profession,

"S/L. Neville Duke manœuvred the Linnet on a proverbial sixpence"

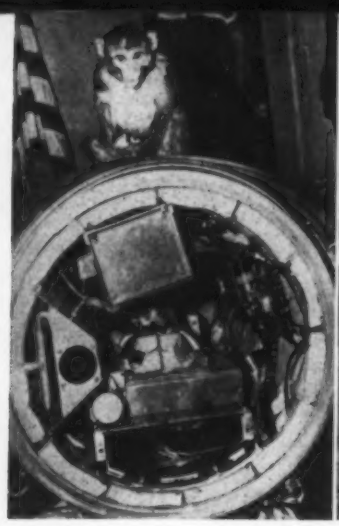
and partly because the hazy weather conditions made it a good day for slow aircraft able to perform all their evolutions comfortably within the circuit area. This did not stop Jeffrey Quill climbing up to about 5,000ft to put his beautiful Spitfire into a fast power-dive over the airfield, or Bill Bedford piling on the coal in his Hurricane when the two aircraft engaged in a tail-chase; and it was good to see these two splendid Battle of Britain representatives in the air together. But the Avro 504K (A. Cdre. A. H. Wheeler) and the Gloster Gladiator (W/C. R. F. Martin), found all the air they needed within the airfield area; and S/L. Neville Duke manœuvred the Linnet on a proverbial sixpence, so that all spectators had a close-up view of the graceful lines of this attractive small aircraft.

Two other items remain to be mentioned, the Royal Navy's contribution and the local product, the Miles Student. The former was an impressive co-ordinated demonstration by four Sea Hawks of No. 806 Sqn. in formation and a solo Scimitar of No. 807; and the latter a most pleasing show of pilot skill (by Duncan McIntosh) and aircraft manœuvrability. It was fitting that the blue-and-white Student should have opened the programme, as F. G. Miles are the lessees of Shoreham Airport; and everyone who attended last Saturday owes them and all concerned in the organization—the R.A.F.A. air display committee, the pilots and controllers, and the commentator (Mr. Alan Brothers)—a debt of gratitude for an enjoyable and instructive afternoon, most successfully staged in spite of unhelpful weather conditions. H. W.





Mike Reilly and (standing-in for Sue Burges) Malcolm Morris used blank-gore parachutes; and (far right) Miss Margaret Horton meets AB 910, the actual Spitfire in which she accidentally flew in 1945—when the pilot took off while she was holding down the tail



Left, launch of the Jupiter rocket which carried monkeys Able and Baker on their flight from Cape Canaveral on May 28. At their Washington press conference on May 30 the two space travellers (Able, centre, and Baker, right) posed for photographers on top of their respective compartments. See first news item on this page

Missiles and Spaceflight

INTERMEDIATE-RANGE BALLISTIC MONKEYS

Two female monkeys were recovered in good health on May 28 after a 1,500-mile flight in the nose-cone of a Jupiter IRBM fired from Cape Canaveral over the Atlantic Missile Range. The launching took place at 3.35 a.m. local time and a maximum altitude of 300 miles was attained.

The two animals, named Able and Baker, were housed in separate compartments in the nose-cone. The larger of the two was Able, a 7-lb Rhesus monkey who had been conditioned to react to a flashing red light by pressing a morse key. She was strapped on to a contoured glass-fibre couch padded with foam rubber, wore a protective suit and was equipped with earphones. The couch was fitted inside an air-conditioned and heated container located in the centre of the nose-cone.

The second passenger, Baker, was a one-pound squirrel monkey who made the trip on a contoured couch in a smaller chamber attached to the inside of the nose-cone close to its base. The heart-beats, muscular reaction, pulse rate, body temperature and breathing rate of each of the animals was measured throughout the flight and telemetered to ground stations, as were the internal temperature, pressure and humidity of the capsules. A radio defect in the nose-cone equipment prevented completion of Able's "psycho-behavioural" morse-key test.

Also carried in the nose-cone were samples of animal and vegetable matter representing various cellular groups. Specimens of yeast, corn, mustard seed, fruit fly larvae and human blood were included, in an experiment to determine the effect on them of high-altitude radiation. Another experiment, which employed the eggs and sperm of sea urchins, was to examine the processes of fertilization under conditions of weightlessness, a phase which lasted some 9 min during this 15 min flight.

The Jupiter was fired from Cape Canaveral by the U.S. Army, and the nose-cone was recovered by the U.S. Navy tug *Kiowa* in the target area 30-60 miles north of Antigua. The nose-cone was reported to have come down five miles from the recovery ship. The successful completion of this experiment will provide valuable information for the Project Mercury man-in-space programme of the National Aeronautics and Space Administration: the Mercury astronauts are scheduled to make similar ballistic flights prior to the attempt to place the first U.S. manned satellite in orbit.

SPACE PLANNERS

First meeting of the steering group which is to guide Britain's space-research programme was held on May 27. The chairman of the group is Sir Edward Bullard, and the other members are Prof. W. V. D. Hodge, secretary of the Royal Society; Prof. H. S. W. Massey of University College, London; Sir Harry Melville, secretary of the Department of Scientific and Industrial Research; Sir Graham Sutton, director-general of the Meteorological Office; Dr. R. van der R. Woolley, Astronomer Royal; and senior officials of other interested Government departments.

HAWK COLD TESTS

During the coming winter it is intended to put the complete Raytheon Hawk anti-aircraft missile system through a cold-weather test programme at Ft. Churchill, Manitoba. The U.S. Army will be assisted in the work by the Canadian Army, and it is unofficially considered that the missile may be operationally deployed in Arctic areas. Earlier this year plans for siting Hawk within the metropolitan United States were cancelled, but the weapon is likely to be used by the U.S. 7th Army in Europe and will be manufactured by a NATO consortium.

On May 22 it was announced in Washington—by Mr. Charles Shuff, deputy assistant secretary of defence for international security affairs—that the Hawk anti-aircraft missile would be assembled under licence in France, West Germany, Italy, Holland, Belgium and Japan.

R.Ae.S. SECTION PLANS

Major lectures planned for the coming year by the Astronautics and Guided Flight Section of the Royal Aeronautical Society include as subjects the optimum size of rocket engines, problems of air-to-air missiles, upper-atmosphere research and electronic trends in the missile field. Other talks and discussions are to be arranged on topics such as high-altitude rocket and satellite vehicles, automatic control mechanisms, communication theory and its application to missile guidance, and interplanetary navigation.

At the annual general meeting of the section in London on Wednesday, May 27, the section chairman, Sir George Gardner, announced that membership now totalled 449, an increase of 131 over the figure for May 1958. Average attendance at lectures was approximately 180, of whom about half were guests.

U.S. ARMY DEFENDS HERCULES

Understandably, the U.S. Army have protested at the decision of the Senate Armed Services Committee to reduce from $22.4m to $5.1m the current appropriation for Nike Hercules missile systems. The Committee also cancelled plans already approved for the installation by the U.S. Army of 50 Hercules batteries in the United States and eight in Hawaii.

An Army spokesman said that the Committee's action would mean the termination of production of all equipment for 54 Hercules batteries, and that thousands of skilled men employed by 24 contractors and 5,000 sub-contractors would be "lost to the development and production effort."

A NOTE ON HOUND DOG

The North American GAM-77 Hound Dog missile was recently exhibited for the first time. A round displayed in Washington was seen to have a curious type of variable propulsive nozzle so that the thrust and turbine temperature of the Pratt & Whitney J52 engine can be modulated to improve efficiency during different flight regimes. It could also be seen that the missile is controlled by a canard foreplane and wing-mounted ailerons. The fin is fixed.

According to *Aviation Week* the engine is to undergo a full 150 hr qualification test so that the powerplants of both Hound Dogs carried by a B-52G may be used to provide additional thrust throughout the take-off of the bomber. Another improvement reported by our American contemporary is that the exhaust nozzle will be redesigned to match the Hound Dog low-level mission requirement.

On May 27 the first IM-99B "advanced" Bomarc was fired successfully on a 100-mile mission from Cape Canaveral. A photograph of a B model appeared in our issue of May 22.

In order to increase their strength in the electronics field, Lockheed's Missiles and Space Division have announced their intention of merging with Stavid Engineering, a major military electronics contractor.

John A. Drake, Director of the Astro Division of Marquardt Aircraft Company, has been appointed to the research advisory committee on chemical energy processes of the N.A.S.A.

THE 53rd WEATHER RECONNAISSANCE SQUADRON, U.S.A.F.

By BETTY ROBERTS

One of the Squadron's WB-50s, weather-reconnaissance version of the Boeing B-50

FALCON ECHO

THE Falcons have left Burtonwood. Some folk in the north of England will be glad. They objected to being roused early every morning by the WB-50 roaring across their rooftops. They could not know the connection between that flight and the weather forecasts they would listen to on the radio during the rest of the day.

The Falcons—the 53rd Weather Reconnaissance Squadron, U.S.A.F.—left Burtonwood because the American Air Force base is being closed. They will be continuing their meteorological flights to the North Polar region and over the Atlantic from their new base at Alconbury, near Huntingdon. But I think we might take this opportunity of thanking them for the work they did while at Burtonwood.

The 53rd is one of seven U.S.A.F. weather reconnaissance squadrons stationed in various parts of the world. It came to England in November 1953 from Bermuda, where it had become famous as the Hurricane Hunters. The squadron is commanded by Col. William W. Riser, Jr.

All tracks flown by the 53rd are named Falcon. The track of the first meteorological flights in England was Falcon Golf, and lay mainly over the Atlantic. When the B-29s with which the squadron was equipped were replaced by WB-50s this daily flight was extended and the track renamed Falcon Delta. This track was flown for the 792nd and last time on April 2. The new daily flight, Falcon Echo, is still made over the Atlantic but now goes farther south.

In addition to the daily flight, Falcon Alfa was flown every third day and occasionally Falcon Special was added, to gain special data on a specific system or as a replacement for a mission which had to turn back. The last Falcon Echo took off from Burtonwood on April 22, but instead of returning there landed at Alconbury.

Delta mission left Burtonwood at 0700 hr G.M.T. every day. The track, 3,686 miles long, extended from Liverpool to a point 250 miles north of the Azores, swung north along the 30th meridian to a point 420 miles south-east of Greenland, and then turned east back to Burtonwood. The first leg was flown at 10,000ft, the second at 18,000ft and the third at 30,000ft. Average time taken was fifteen hours. Weather observations were made at fixed points 150 n.m. apart. The weatherman, seated in the nose of the aircraft, recorded wind speed and direction, pressure, humidity, temperature, cloud conditions, visibility, surface winds, and pack-ice conditions (if any). Radar findings were added.

At five of the nineteen "obs" a radio-dropsonde was released. Descending at 1,500ft/min, this transmitted back to the operator in the aircraft readings of temperature, pressure, and humidity every 100ft until it hit the sea.

Since the aircraft was unable to maintain direct radio contact with Burtonwood, the information gathered was coded by the radio operator and sent to Croughton radio station, near Uxbridge. From Croughton the information was transmitted to the 53rd's weather monitor at Burtonwood, where it was decoded and carefully checked for transmission errors before being sent by direct teletype to the Central Weather Station at High Wycombe.

"Falcon Echo" crews being briefed

Similar observations are made on the Falcon Echo flight, now being continued from Alconbury. The track runs down to the Madeira Islands, then swings northward to a point on the 26 deg W meridian near the Azores, then almost due north-east back to England. Falcon Alfa, flown on every day with a date divisible by three, is also being continued from Alconbury. The track extends up the coast of Norway into the Polar regions and back by Iceland and down the west coast of Scotland—again, out at 18,000ft and back at 30,000ft. This is the flight that achieved fame in the national Press one Christmas, when it became known that when flying over the North Pole the crewmen obliged home-base children by dropping letters there for Santa Claus.

I was able to visit Burtonwood before the 53rd left, and saw one of the WB-50s (four Pratt & Whitney R-4360) with which the squadron is now equipped. The aircraft is large, with a wing-span of 141ft, and a fuselage 99ft long and 33ft high at the tail-fin, yet there does not seem to be much room inside. There are two pressurized compartments, connected by a narrow tunnel running over what was the bomb-bay of the original Superfort. Instead of bombs this now houses a fibre tank, jettisonable in an emergency but necessary to enable the WB-50 to carry the 10,000 U.S. gal of fuel required for the weather flight.

Most of the space in the forward compartment seems to be taken up by instruments. To ensure the navigational accuracy required for weather reconnaissance the WB-50 carries Loran APN-9, N1 gyro-stabilized magnetic compass, two ARN-7 radio-compasses, APS-23 radar, a much-used D1 periscopic sextant, Doppler (AN/APN-82) and a good old-fashioned drift-meter. As far as the navigator is concerned, the Doppler consists of six dials respectively showing wind speed, direction, ground speed, track, magnetic course and up to 50 degrees drift.

Behind the weatherman's position are the seats for the two pilots, the flight engineer, and the two navigators. In spite of all the instruments, they still work out their position by dead-reckoning, relying on celestial fixes most of the time. In the rear compartment are the two radio operators and, in waist-blisters, the dropsonde operator and extra flight engineer. I was told that these men have to keep an eye on the wings, which the pilots cannot see, and that they also have to prepare the meals.

For a moment I allowed myself to picture two men, with aprons over their flying suits, sitting in the waist-blisters peeling potatoes; but the two hot meals of meat, vegetables and gravy are, of course, pre-cooked and frozen in metal-foil sectioned plates and only need to be heated in the neat electric oven. Supplies of milk, coffee, fruit, cakes and candy are also carried.

I was told that the 53rd was proud of the fact that it had never once failed to complete its mission. Aircraft have had to turn back with engine trouble—one with a seagull in one of the carburettor intakes—and one force-landed in Norway. But there has always been a WB-50 and crew standing by to finish the job.

The seven American Weather Reconnaissance squadrons have a competition for the Senter Award "for excellence in weather reconnaissance." In 1957 the 53rd won this award, and also a M.A.T.S. Flying Safety Trophy for an accident-free year. And yet most of the approaches at Burtonwood had to be made under G.C.A.

Some people think that every American aircraft in this country is carrying a hydrogen bomb and is a potential danger to everyone below. But here is a squadron that is making a real contribution to the safety of our aircraft as well as its own. Let us wish them good luck as they settle down at their new base at Alconbury.

"Between the elaborate aircraft park and formal displays . . . the variety of aircraft/missiles overshadowed the World Congress displays"

An American in Fantasyland

CURIOUSER AND CURIOUSER ON U.S. ARMED FORCES DAY **By WARREN M. BODIE**

AT the dawn of a busy Armed Forces Day week-end, the weather along the California coast from famed Malibu to Oxnard (some 30 miles to the north) was as close to perfection as any person could desire. My British-built A. C. Ace cruised along at a brisk pace, seemingly with very little urging on my part, in the cool breeze of morning.

Although my intended destination was the remote desert base of the Air Force Flight Test Center—Edwards A.F.B., near Lancaster—an unscheduled visit to the Navy's Missile Test Center at Pt. Mugu, just south of Oxnard, was a definite possibility. Security barriers are infrequently relaxed at that ever-expanding station, a key element of the Pacific Missile Range, but luck was with me. Many restrictions had been shelved, at least for a few hours.

Upon arriving at the flight-line, I was greeted by the sight of several new and unusual aircraft and missiles.

At this early hour of 0830 no civilian crowds had entered the gates, so there was a relatively unobstructed vista for technical photography. Having limited myself to one camera—I have carried as many as three, plus a 5×7 aerial camera—and an abundance of film, it was possible to concentrate more effectively on the displays.

Presently a crew of petty officers unexpectedly towed a new McDonnell F4H-1 up to the static display area, chocked its wheels, and surrounded the angular beast—it is no thing of beauty—with stanchions and ropes.

This proved to be the first public exhibition of a type which emerged as the victor from contention with the F8U-3 "Crusader III." Dummy Sparrow missiles were nestled against the lower fuselage, below the huge, gaping inlet ducts. Assigned to NAMTC for missile firing tests, the F4H-1 appeared to be unmodified, except for an instrumentation bulge on the nose just below the plastic cap.

Two exceptionally intriguing types were parked just to the north of some conventional varieties. One was Lockheed's ubiquitous Neptune—in this case a P2V-5FD (*gulp!*) equipped with two Ryan KDA-4 missile targets, presenting the unique façade of a six-engine airplane. The other was an R4Y-1, a designation which suggested a normal Convairliner type; but with the usual inconsistency of naval designators, this proved misleading. What, indeed, was the significance of all those lumps on the fuselage? At least six large radomes of various sizes erupted from the fuselage proper, and there were other protrusions of varying shapes and sizes. The only clue provided was that of special insignia bearing the magic word "countermeasures."

"A delightful slow-flying demonstration of a gleaming new Helio L-28"

Old and new missiles, targets and drones were placed conveniently around the floor in one large hangar: Regulus I and II test vehicles, Gorgon II, Lark, Temco XKDT-1, Radioplane KD2R-5 and XKD4R-1, Beech XKDB-1 with Jato boosters, Bullpup, and more. One expects to see most Navy missiles at a base such as this; there must have been few disappointed observers.

Before taking my departure at 1000 for the desert country, some 130 road miles to the east, I completed a final tour of the static park. There were numerous operational types: North American FJ-4B with six Bullpups; Douglas A3D-2 and A4D-2; Vought F8U-1; Grumman F11F-1, F9F-6K (drone with at least six pilotless landings), and S2F-1; a Lockheed WV-2; and an Air Force Boeing KC-97G (slightly shunted to one side). Missile pylons under the wings of the A3D-2 were recent additions, further increasing the firepower of this strategic bomber.

As I drove along the well-patrolled route traversing a remote area of the station, it led me past a long concrete firing parapet surmounted by two batteries of SAM-N-7 Terriers and two Vought SSM-N-8 Regulus I strategic—if obsolete—missiles. All of these deceptively small Terriers—each weighs with its booster somewhat more than most European automobiles—and the two built-in-Texas pilotless bombers were launched in the course of the day's festivities. A resounding demonstration. (One cannot help conjecturing about future events; will they someday launch Atlas and Titan missiles at these displays?)

But *tempus fugit*, and the Saturday (May 16) flight demonstration at Edwards was scheduled for 1315. Capably directed by Col. Charles Brown, one of the most personable and conscientious information officers in the Air Research and Development Command, the flying events were certain to conform to a strict schedule.

Sports car *aficionados* tossed a "thumbs-up" sign or waved in my direction as the Ferrari-red A. C. droned northward, paralleling the coastline, toward the city of Ventura. (Those cars are not commonplace vehicles, even in California, except on the twisting race circuits.) Minutes later I turned onto Highway 126 and headed inland at a fast pace. Crossing the busy central North-South super highway (Route 99), the car thundered through a winding mountain pass into the famed Antelope Valley at Palmdale. Up to Lancaster—busy as a Yukon gold town and mushrooming like an atomic cloud—and then out into the hot, brush-covered and windswept desert. The clock indicated 1245; the speedometer flickered between 90 and 100; the miles melted away; and at last I entered the sprawling military reservation.

Few people at Edwards recall the problems and vicissitudes encountered in the embryonic stages at the Flight Test Center. And that is another story that may be told later. But today—and the growth period is not nearly ended—it is a modern, efficient base of enormous proportions.

When I first visited Edwards in 1950 on the inaugural Armed Forces Day, Gen. Albert Boyd was struggling to improve intolerable conditions and overcome problems of decaying morale. That he and his successors won their battle is evidenced in many ways. Brig. Gen. John W. Carpenter III now commands not only the

second-largest U.S.A.F. installation in the world, but maintains authority over some 11,000 uncomplaining airmen and employees. Conditions are vastly improved.

Arriving at 1300, I saw a Boeing KC-135 tanker pass overhead, its fuelling boom secured to a giant B-52G. Saturday's events were generally limited to the personnel working at the base, their families, and invited guests. Some 20,000 spectators were on hand, swarming over the brilliant white expanse of the ramp like ants in search of food. In many respects, the Edwards show was more overwhelming than the Las Vegas event. Between the elaborate aircraft park and formal displays—appearing almost toy-like—in the enormous maintenance and modification hangar, the number and variety of aircraft/missiles on exhibition overshadowed the World Congress displays.

Sonic booms from an F-104A streaking overhead at Mach 2 and from a diving F-100D shattered the air and rattled the inconceivably large maintenance/modification hangar. In groups and individually, the jets and turboprops streamed by at brief intervals: F-86s, T-33s, F-100s, a rolling McDonnell F-101B two-seater, Convair's TF-102A trainer, stub-winged F-104As, a thunderous F-105B, four tandem-seat F-106Bs, a B-57, Douglas's C-133A, a new Lockheed C-130B, and others.

A delightful slow-flying demonstration of a gleaming new Helio L-28 Courier was followed by a Sud-Aviation S.O. 1221 Djinn helicopter performing a full repertoire of low-level aerobatics. And then, unbelievably, it happened. As Capt. William Lake finished his final manœuvre, the Djinn pitched downward from 100ft and crashed directly in front of the official visitors' boxes. The pilot died from the impact and fire that followed. This, the first accident at an AFFTC event in ten years, shocked and saddened the crowd.

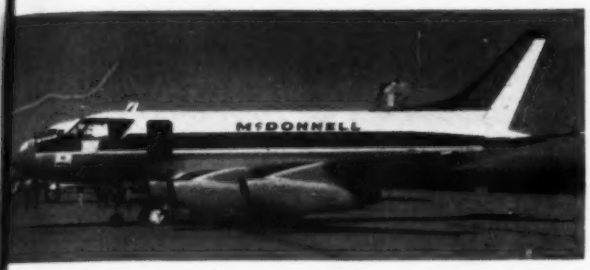
Sunday morning dawned bright and clear, giving me an opportunity to study all aircraft on static display without interruption. Most military types exhibited at the recent Las Vegas spectacle were in evidence—bold evidence, for nearly every airplane was decorated with gay patterns of fluorescent orange paint. But many types peculiar to the needs of the test center had not been in evidence at the World Congress of Flight. These comprised an F-102A engine test-bed with its retractable G. E. J85 jet pod, a red RB-66A with CJ-805 commercial turbojets (incorporating sound suppressors), McDonnell's spanking-new Model 119 and dazzling-hued F4H-1, a Vought F8U-1M with ventral fins and afterburner cooling (*à la* F8U-2), the F-107A of NASA, one Lockheed Jetstar, a JF-101A for J79-engine development flights, a Doak 16, a modified Vertol 76 (VZ-2), and the revised Bell XV-3. Others included a giant C-133A named *Ol' Smokey*, a new C-130B, Douglas A3D-2 and the tired old A4D-1 used for 275 test missions. Prominent at the end of the display area—encompassing only a fragment of the vast ramp at North Base—was the Boeing NB-52A-1-BO dominating the surprisingly long X-15 (complete with the XLR-11 rocket motors).

In the maintenance and modification hangar key exhibits included a regular-type Atlas missile on its transportation trailer. Conveniently arranged for spectator viewing were all three Rocketdyne propulsion units removed from the cylindrical body. A twice-wrecked F-104A—now scheduled for conversion to a QF drone function, according to an informative technician—appeared to be in relatively good condition. Accident photographs on an adjacent panel attested to the ruggedness of the airframe.

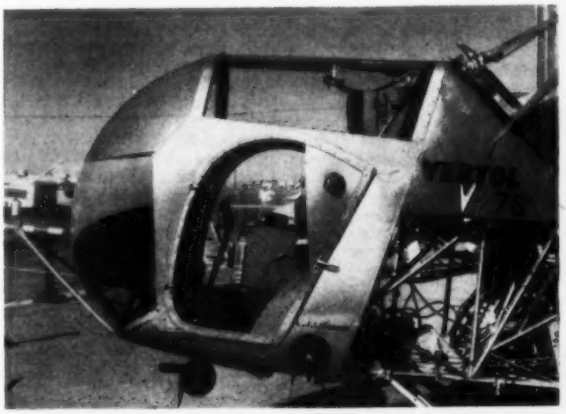
Another hour of flying events followed after a midday meal; pilots taxied their mounts past the tired but happy audience, and another week-end of festivities gradually dissolved in the face of approaching evening winds. Remembering the old Air Corps events at Selfridge Field, Michigan, *circa* 1934, I could not help feeling impressed with the growth of air power.

ALL PHOTOGRAPHS BY WARREN BODIE

"An F-102A engine test-bed with its retractable G.E. J85 jet pod . . ."



"McDonnell's spanking-new Model 119 . . ." (at Edwards above); below, the bulbous Convair R4Y-1 employed at Point Mugu on countermeasures



Three curious VTOL machines: the Doak 16 (below), the much-revised Bell XV-3 (below right) and the nose of the Vertol 76 (above)

The Far East Air Force

Jungle Supply Dropping

By NORMAN MACMILLAN

PART III

Final instalment of W/C. Norman Macmillan's article, Part I of which appeared in the issue of May 8 and Part II on May 22

R.A.S.C. Air Supply Force dispatchers (above) await the pilot's orders over the intercom on a supply-drop by Valetta over the Malayan jungle. Right, F/L. P. Peckowski of No. 194 Sqn., with whom the author flew

THE transport squadrons at Changi detach aircraft and crews to Kuala Lumpur for the Air Supply Force, whose chief rôle is supply dropping to security forces in the jungle, leaflet dropping and paratrooping. An Air Maintenance Platoon of the R.A.O.C. receives and packs the stores and supplies for dropping and accounts for the equipment used. A company of the R.A.S.C. is responsible for co-ordination with the R.A.F. and anything connected with flying or trials of equipment. The average weight of packaging is 350 lb. Three sizes of parachute are used; the two smaller ones are recovered and used up to three times, the large newer utility pattern is used once only. The fabric is usually cotton and nylon, but experiments have been made with nylon only.

The Valetta in which I flew on a supply drop carried an R.A.F. aircrew of three—pilot, navigator, signaller—and four R.A.S.C. dispatch crew, two as dispatchers and two as handlers. The handlers brought the packages to the freight door, the dispatchers heaved them out on a simple wooden dispatching board. I stood behind the pilot, F/O. J. D. Wilson, as he curved down at 130 kt then levelled out at 400ft at 120 kt and said "running in!" over the intercom. I went aft and watched the dispatchers at readiness. Three bells sounded. They lifted the dispatch board handles. Then came the pilot's voice: "Now!" and the dispatchers heaved the package overboard. Each time a load went out, Lt. J. Murray clung to the rear upright of the fuselage opening and swung out his body so that he could watch the 'chutes opening and the package descend. Once he had difficulty in forcing himself back into the cabin because the airflow held him outside. Even with safety harness a fall outside would be unpleasant.

Handlers and dispatchers worked hard and quickly, wasted no time on words. Each knew his job and did it silently and efficiently. Youngsters coming on this job often arrive thin and weedy types, I was told. They are taught how to lift and soon handle 350 lb loads with ease. They return home with finely developed muscles and excellent physique.

The Valetta circled and re-circled. By intercom Murray told the captain: "Three chutes to go, load so-many pounds, colour blue." Wilson reduced speed, the red light glowed on the dash, the buzzer vainly called for the unregarded undercarriage to be lowered. Out went another load. The navigator shoved his arm forward as signal for the captain to open the throttle. Up and round, down again over the jungle towards the fort whose smoke fire rose from its drop zone. Run in, dispatch. We see the men of the fort wave cheerfully at the end of the drop as the Valetta departs to make another drop at a D.Z. for the police, in a small circular clearing among the trees beside a river that looks like black ink flowing in a sinuous line across patternless, dark-green mohair. There, too, on that more difficult spot the drop was a complete success and soon we climbed away and up to 4,000ft, then set course for K.L. and gradually climbed to over 5,000ft to clear the hills and clouds, sometimes entering the white vapour. At last we came to the plain with its alluvial tin mines, great white stadium, ornate railway station and Hindustan-architectured Government buildings that are the chief landmarks of the Federal capital; and then glided down to the drab aerodrome.

I flew into several of the forts by helicopter—a Sycamore piloted by F/L. P. Peckowski, a Polish pilot now in the R.A.F. He handled his chopper magnificently. If there is one criticism I have of helicopters it is that I cannot write in them because of the throbbing of their life-pulse; otherwise I like helicoptering. We flew low over immense jungle-clad mountains, skimmed the shoulders of some, alighted feather-like on diminutive airstrips perched on flattened hilltops or carved out of the forest beside some river, and yet again on bamboo matting laid out on the usually damp ground.

On one airstrip the police commandant asked "Peck" if he were going round by the river or over the top. He looked at the sky. It was a fine day. "Over the top," he said. By the river was the bad-weather route to the next fort; it took 30 minutes that way. Over the top took about ten. We rose (four up) from the strip where more than one Pioneer has crashed on the dangerous approach and faced the steep slope of a cauldron-shaped valley whose sides were nearly vertical. The airstrip was 1,320ft above sea level. The crest of the cauldron was about 5,000ft. Within that great wave of jungle our helicopter climbed, rotating like the bobbin on an Archimedean drill, giving us a wonderful view of mountain, river, forest and fort.

These forts have temporary buildings, all small, all separated, some of native construction of plaited bamboo, some of wood poles and thatch, some of corrugated iron sheet, some of timber. They comprise police officers' mess, police troops' dormitory, radio station, workshop, store, fort H.Q., dispensary, store and school for aborigines. Cleanliness is exemplary. Officers and troops are smart; their tour lasts about two or three months. Footpaths are good, flowers are grown. Among the Muslim Malays soft drinks are the rule. The surrounding scenery is beautiful. Aborigines live in their *ladangs* and long houses around the forts, often high up on the hillsides. Undoubtedly these forts have figured largely in the defeat of the terrorists. They could not have been created or maintained without the Air Force. The air link is the one means to keep them supplied, to relieve the garrisons, to bring regular troops to them to fight in the jungle, to evacuate sick and wounded, to keep the forts a part of civilized Malaya, and to bring the 50,000 aborigines within the community of peoples who now form the Federation of Malaya.

The order of air supply is first by parachute drop, then fly in by Pioneer, and lastly by helicopter—an order chosen on grounds of relative economy of operation. However experienced a pilot is he has to do 30 operations for close jungle work before he can become a first pilot. Many pilots new to Malaya jib at this, but not after they have been for a flight over the jungle. Pilots have to know their way about by familiarization with the jungle, by ability to recognize landmarks that are new and indistinguishable to inexperienced eyes. There have been casualties, but on the whole not so many, because experienced crews know just how far they can take risks and where they must either not start out in the treacherous climate or alternatively return home before completing their mission.

External Security. Outside Malaya, the Far East Air Force has commitments to SEATO and associated responsibilities with British Forces Aden Peninsula. As a self-contained command, its striking power and defence and air transport have all been increased and no doubt will be increased further. As in Malaya, so externally, F.E.A.F. must be able to airlift Army reinforcements where needed—as, for example, to Hong Kong. The Beverleys now in F.E.A.F. have greatly augmented these powers.

It has recently been stated by Air Marshal the Earl of Bandon, the Commander-in-Chief F.E.A.F., that Singapore may have surface-to-air guided weapons. Singapore is only 1,050 n.m. from the nearest Chinese airfield in Hainan and N.E. Malaya is only some 760 n.m. distant from it. Today, as far as the West is concerned, Russia is considered the enemy. But the Australians think their enemy is China. Communist China is coming along fast. A mistake was made once before in Singapore in expecting the attack to come from what proved to be the wrong direction. That mistake must not be repeated. The deterrent is as necessary in S.E. Asia against China as it is in Western Europe against Russia. Doubtless it will be created.

THE INDIAN AIR FORCE

An Appraisal of a Commonwealth Air Arm

By ALASTAIR PUGH PART II

THE I.A.F. takes technical training very seriously and in size and scope the training facilities are most impressive. Jalahalli Air Force Technical College at Bangalore, where technical officers are trained, is the keystone of technical education, while at I.A.F. Jalahalli are No. 1 Ground Training School for airmen in the non-technical branches, No. 3 Ground Training School (signals) and the Medical Training School for airmen who have enlisted to become ward orderlies or medical assistants. With No. 2 G.T.S. at Tambaram, near Madras, the combined population of these extensive establishments is between 2,000-3,000. The school at Bangalore was begun in 1944 and has taken over the pleasant buildings, sheltering behind the shade of rambling bougainvillea, that were erected as a hospital town during the war; altogether the various schools and college extend over ten miles.

This was more than I could hope to see, but from his office at Station Headquarters G/C. K. Chand, who commands I.A.F. Jalahalli, painted for me an overall picture of the progress of training. The various courses last from 40-52 weeks and 300 or 450 permanent staff are employed in looking after the training institutions, each of which is entirely devoted to instruction; administration and welfare are the enthusiastic responsibility of the I.A.F. H.Q. Dormitory huts are models of neatness, and even the cookhouse and mess—where *chapatis* were being cooked over the traditional open fire—preserved an air of orderliness that betokened strict and determined training. Here, as throughout the I.A.F., the official language is English, and it may be the only common denominator between boys of widely different backgrounds. In the past few years, however, the schools in the country have taught English less well than was formerly the case, and some basic training may have to be given before technical instruction can get under way.

The officer commanding No. 3 Ground Training School is W/C. Sabhaney, and he is responsible for the training of signallers, radio operators, met. assistants and fighter plotters. Senior N.C.O.s in the Aeronautical Inspection Service are also trained here. Under W/C. Sabhaney's guidance I visited various classrooms in the school and as we walked he told me that courses are divided into four phases, with exams at the end of each three-monthly period. The final examinations are conducted by a central school examinations board, and a review board redirects into a more suitable trade those airmen who cannot make the grade as technicians.

Instructors are obviously extremely keen: the sergeant who showed us around the air-conditioned A.I.S. standards room in particular was very reluctant to let us go until he had explained in detail every function of all the materials test equipment.

Instruction has obviously been thought out to place the maximum emphasis on realism. For instance, a fighter-plotter class were moving their counters in simulation of a large-scale exercise under the watchful eye of the controller; radio servicing is practised in a deliberately restricted space to simulate the confines of an aircraft; and for training airfield controllers a complete and working AD.200 V.H.F./D.F. set has been established in a hut which is an exact replica of those to be found on I.A.F. airfields.

After passing out at the end of the basic course, the airmen (who are enlisted for an initial period of five years' service) are posted to their units, but they may return to Jalahalli five years later for advanced training as senior tradesmen.

One feature of the school that left a deeply favourable impression was the off-duty information room, lined with wall charts giving statistical information on India and the rest of the world. Almost everything seemed to be there: India's animal population, the world's air speed record, the seven wonders of the world, the aims and progress of the second five-year plan, the fastest time for the mile, the names of cabinet ministers, and so on.

The third school at Jalahalli (commanded by S/L. R. Jayaram) is for medical students who undergo a 52-week course of all-through training. It is excellently equipped and some of the medical demonstration models (to the layman, as horrifying as most of their kind) are exquisitely made; I particularly liked a table-top model showing "an insanitary village" before and after it had been cleaned up and re-organized.

The senior I.A.F. institution at Bangalore, commanded by G/C. M. J. Kirpalani (a graduate of Manchester University and Cranfield) is the Air Force Technical College, which stands in its own grounds near Jalahalli airfield some miles from Bangalore. It was established with the expansion of the I.A.F. in 1949 with the twofold aim of training apprentices as a nucleus of skilled tradesmen and supervisory N.C.O.s, and to train technical officers to be able to undertake any type of technical work, including research and development.

The college carries something of the *esprit de corps* of the R.A.F. Colleges at Halton and Henlow, the functions of which it largely combines, although the terms of entry are adjusted to suit local conditions. In particular, the I.A.F. does not as yet have to face such severe competition from industry as does the R.A.F., though with the industrial expansion contemplated under the successive five-year plans it seems probable that this may become a growing problem.

Indicative of the standard expected from I.A.F. technical officers is that a condition of civilian entry to Jalahalli College is an engineering degree, armed with which graduates are commissioned as pilot officers on joining. A small number of entrants are accepted from the ranks, and these men become flight cadets for the duration of their training, after which they are commissioned as technical officers. This course lasts about one-and-half-years.

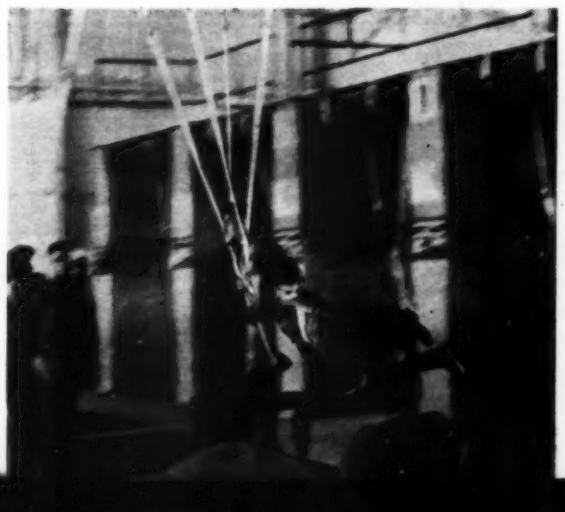
For technical officers academic, scientific and practical studies begin after eight weeks of full time general service training, which is then reduced to a commitment of six hours per week for the rest of the course. The encouragement of "critical thinking and logical reasoning" is the very essence of all the training and scope is provided for practical (and original) project work in connection with operation, servicing, repair and overhaul, with particular emphasis on research and development.

How well these aims are fulfilled must partly depend upon the quality of the instructors and the facilities, and on both scores Jalahalli seems particularly well equipped. Both service and civilian instructors are employed and are chosen not only on their qualifications but by their ability to teach. The installations are excellent; the college was most comprehensively equipped by Air Service Training of Hamble when it was established in 1949, and the range and layout of the equipment is a source of particular pride to the staff.

Particularly noticeable during a quick tour of a few of the classrooms were a smoke tunnel with a variable working section, a standards room equipped with beautifully maintained equipment

Two aspects of training: (left) a pupil at the Parachute Training Wing practises jump-offs from the indoor simulator and (right) in a darkened room at Jalahalli, trainee fighter plotters follow the onslaught of a hypothetical "blue force" under the watchful eye of their instructor

"Flight" photographs



THE INDIAN AIR FORCE . . .

for every aspect of materials testing, and an engine laboratory, complete with Pratt & Whitney R-1830 and Goblin, equipped to the standard of an overhaul shop in miniature.

For the college's aircraft apprentices the course lasts for nine terms, each of 22 weeks. Entries are restricted to boys between 15 and 17½ who have obtained matric with science and mathematics, and who can pass the initial exam to determine their aptitude. For 18 weeks they are given general Service training and instruction in the basic workshops (to disclose an aptitude for engineering or electrics) and in English, algebra, geometry, trigonometry and dynamics. At the end of this period, and on the results of another test, aptitude and preference each apprentice is allotted a trade.

Courses for both officers and apprentices are intensive and leave little free time between reveille at 0600 hr and lights out at 2200, but academic and practical studies are levied by hobby periods and organized games. For a trainee whose progress is marginal and who does not improve under the combined efforts of the section commander, instructor and chief instructor's individual tuition, a progress board of six senior instructors will investigate the reasons for his poor performance. Considerable efforts are always made to improve a pupil's standard before his training is discontinued and he is rejected.

Flying Training

"Nagaland is a largely mountainous country straddled with ranges whose peaks climb to 10,000ft; lush jungle stifles the lower reaches. Flat ground is practically non-existent and the narrow valleys, where most of the D.Z.s are located, afford a Dakota little more than wing-tip clearance. Once over the ring of hills girthing the area the search for the D.Z. begins; an operation necessitating continuous low-flying. Lesser offshoots of the main range jut out awkwardly in the limited path of flight, forcing the pilot to take rapid evasive action. With the controls sluggish at reduced speed, the drop is executed with no small difficulty. In quest of the dropping zone, the aircraft descends to 150ft. There is little room for pilot error. Acute claustrophobia, aggravated by a cloud-base frequently no more than 200ft, harries the crew. When the D.Z. is picked out, free-dropped and parachute-lashed packages are pushed out, and the aircraft banks steeply for the turn-about and return-run over the target area. Rid of its burden, the Dakota—now lighter by 6,500 lb—is put into a steep climb to clear the mountain barrier at the end of the valley. The operation is undertaken all through the year, even during temporary let-ups in the monsoon period."

This semi-official account of operations in the mountainous north-east corner of India (the Naga hills are in south Assam) gives some indication of the standard of flying that is expected from pilots of the Indian Air Force. And although this is a specialized transport operation and gives pointers to the courage of the I.A.F. pilots and the quality of training which makes this high standard of skill possible, the young officers flying DC-3s in Assam are certainly not regarded as being in any way exceptional.

"Flight" photograph

Hindustan Aircraft have converted a number of Dakotas for I.A.F. use as navigation and signals trainers. This is one of six pupil positions in a navigational trainer

Flying training for all Indian Air Force aircrew, pilots and navigators, begins at the pleasant station at Jodphur on the edge of the Rajasthan desert overlooked by red flat-topped hills and the multiple minarets of the Maharaja's palace. As our Dakota swept over the town to a landing on the broad airfield, the red sandstone glowed in the setting sun and the lights from the houses began to twinkle under the solitary evening star. For one more day flying was over and the aerodrome was quiet for an hour until night flying began.

The station commander at Jodphur, G/C. J. Chandra, briefed me the following morning on the work of flying training.

Aircrew join the I.A.F. either by direct entry or from the National Defence Academy. The latter institution is particularly interesting, because it has no direct equivalent in this country. It was formed in 1949 at Dehra Dun, but really has its roots in the Indian Military Academy which was established by Field Marshal Sir Philip Chetwode, who was then commander-in-chief, Indian Army. With independence the Academy was reorganized and extended in scope to provide combined preliminary training for officers of all three services, and in 1954 was established as a self-sufficient "unipurpose township" extending over 7,000 acres at Khadakvasla, 11 miles from Poona. The cadet intake is for boys of school-leaving age and for two years cadets of all services live and work together. In the third year, emphasis shifts to Service subjects, I.A.F. cadets being given limited air experience on gliders.

The I.A.F. considers that it is reasonably well equipped to determine whether a candidate will make a good officer, but

After initial deliveries of Gnats from Folland, these aircraft and their Orpheus engines will be constructed in India for I.A.F. use. This is a Folland-built Gnat Mk 1, still in its pre-delivery undercoat

whether he will also be a good pilot is by no means so easy to find out. Entry as aircrew is conditional on three tests that have been instituted by the selection board—an instrument reading test; a test for co-ordination of hands, eyes and feet; and a test requiring both co-ordination and anticipation. After a period of years in which they were used only experimentally, these tests have shown a reasonable forecast of the likelihood of an individual achieving success in aircrew duties.

As with other Services, the I.A.F. has recruiting problems which limit the civilian intake, but there is a surprising problem in relation to aircrew; it stems from parents' hesitancy to allow their sons to be subjected to what they consider to be a very hazardous occupation—a great deal more dangerous, they imagine, than, for instance, service in the army or the navy.

Apart from direct entrants, who are given an additional four weeks' tuition to bring them up to the N.D.A. standard, a fresh course of young pilot-cadets is started every six months. The year-long course at Jodphur is divided into two stages, each of which lasts for about six months, including an eight-week leave period in mid-summer timed to coincide with the monsoon period. For part of this time flying training in any case becomes impossible.

G/C. Chandra emphasized that individual attention was to be found in every phase of training, not only in the air but on the ground as well. The "survival of the fittest" wartime aircrew factories had no part in the modern I.A.F. and every personality was given a chance to develop.

The three main aspects of academic work—technical, humanis-

"Flight" photograph

"The Otters are a mixed bag of camouflaged and silver-finished machines . . . very suitable for the job"

tics and administration—are controlled by the Director of Studies. Administrative discipline is the responsibility of the squadron commander and course commander and a cadet in charge of each course.

Technical instructors come from the I.A.F. Technical College at Bangalore, and consequently are graduates of a civil engineering college; humanistics (languages, history, current affairs) instructors are serving officers who have been trained at the Air Force College; and admin. instructors are graduates of the I.A.F. Administrative College. Normally all staff officers are rotated by postings in the normal service manner and are stationed at Jodphur—in the comfortable mess or in private accommodation—for a maximum period of three years.

Unlike Cranwell, where the emphasis of training is on academic study, Jodphur imposes a bias, in everything except the number of hours devoted to instruction, towards flying training. A great deal of careful thought has been given to the syllabus and as a result the breakdown of flying training to wings standard has recently been revised to lay more emphasis on the later stages of training, either on Vampires or Dakotas. Previously, 80 hr of basic training was followed by 100 hr intermediate training and 60 hr of flying jets, or 120 hr on transports. Now the balance is 50 hr on the Hindustan HT-2 basic trainer, 75 hr on T-6G Texans (all performed at Jodphur) and 140 hr on Vampires or 250 hr on Dakotas. (For comparison, the R.A.F. gives 160 hr training on Jet Provosts and 80 hr on Vampires).

The I.A.F. are extremely interested in all-through jet training and were very willing to co-operate in the Jet Provost experiment conducted at Jodphur earlier last year, when two pupils were trained *ab initio* (see *Flight*, November 21, 1958). The I.A.F. fully intends to adopt all-through jet training as soon as possible; but because there is no readily available market for disposal of its present equipment, these aircraft will have to be further depreciated before a change can be contemplated. Whether the Jet Provost or the indigenous jet trainer now under consideration at Hindustan is the most likely choice it is too early to tell. The Fouga Magister has also been evaluated, and was well liked.

The HT-2, meanwhile, has proved to be a satisfactory basic trainer, sturdy and well up to its job. As mentioned earlier, great pains are taken to ensure that pupils who have started basic train-

"Flight" photograph

The I.A.F. primary trainer is the HT-2, designed and built by Hindustan Aircraft in Bangalore. This characteristic view shows an instructor and pupil at the start of a sortie from Jodhpur

ing are given every opportunity to complete the course. As always, the enthusiasm of a particular pupil very greatly affects his rate of progress, but where it is slow a change of instructor is tried, next an air test with the flight commander, and then, in still-doubtful cases, with the C.F.I. Before a pupil is finally suspended a review board will study his case and if it is considered that there is still a chance of success a final chance is offered.

One wonders if such painstaking selection is worth while. G/C. Chandra told me that it had been found that patience was rewarded because the quite small numbers of slow learners were not eliminated; in the days of harsher rejection, several pupils who had failed to make the grade had eventually become admirable pilots with Air-India.

The I.A.F. is persistently curious about a man's potential, and detail explorations into training methods are always considered worthwhile for the lessons that they can teach. While such a gentle approach to aircrew selection may not be possible in time of war, analysis of its results is providing a clear indication of the extent to which nursing in the early stages of training should be taken. As it is, the rejection rate on a typical course is about 30 per cent of the entry, although some recent results where "the boys were as keen as mustard" showed a suspension rate of only 21.5 per cent.

Navigator entries are either direct or from the N.D.A. The airborne phase of instruction (which supplements ground training) is undertaken in the navigation squadron's Dakotas, modified as flying classrooms. A similar conversion provides cubicle-type divisions in an aerial-spiked Dakota used for training signallers. Instruction in radio aids (Rebecca, Babs, Loran and Gee) is begun in about the ninth week of the course; few of these aids are used in India, but I.A.F. Transport Command Packets are equipped with them for overseas flights.

Jodhpur's cadets have worked hard to make the station as self-contained and as pleasant as possible. A sports pavilion (a feature of which is a large board showing world, national and station athletic records) has been erected on a self-help basis and the cadets have also built an open-air cinema and theatre (with revolving stage) alongside the playing fields.

At Jodhpur at the time of my visit, de Havilland Otters of a Logistics Air Support Squadron were practising their slow approaches and short landings on the ample runway. Their drab finish was in marked contrast to the trainers on the Jodhpur circuit —silver HT-2s and Dakotas, bright yellow T-6Gs—but this airfield is their temporary home while they undergo an intensive training programme. The squadron, the first of its kind in the I.A.F., was formed in March, and flying began when the Otters were received in April. Training is in three stages: basic conversion flying, short landings and take-offs, consolidation flying and then continuation training. Some formation flying is also being practised.

By this time, the squadron should be quite ready for active support of army units up to the size of a brigade group. An army liaison officer is normally attached to the staff and army lectures and army co-operation exercises are soon to be undertaken. The Otters are a mixed bag of camouflaged and silver-finished machines equipped internally with seats for ten passengers and room for their kit. The low-speed handling qualities, ample payload capacity and simple cockpit make the Otter very suitable for the job which the squadron hope to perform with it—though, being designed in a cold climate, the cockpit is not air conditioned and gets fairly hot. But the aircraft does remain waterproof even in monsoon rain, and this is a condition in which it is expected the Otters will operate regularly.

(*To be continued*)

Thunderbirds at Manorbier

PUTTING "RED SHOES" INTO ARMY SERVICE

Newly received Thunderbirds arrive in "cigar" form and are assembled at the Field Assembly and Test Point, as depicted below and left. The round seen in the large picture below is completely assembled and boosted and is being swung off its trolley by a mobile crane

"FLIGHT" PHOTOGRAPHS

POINTING skywards from a Pembrokeshire cliff-top on Friday last week were two English Electric Thunderbirds. These missiles form part of the equipment of the Royal Artillery's School of Anti-Aircraft Artillery at Manorbier, between Tenby and Pembroke Dock; and provide a visible sign that the Army has started to replace its conventional artillery by guided weapons and that Thunderbird has entered service.

At Manorbier the Army has been engaged since Christmas in working the bugs out of the Thunderbird system, and the first of two heavy A.A. regiments to be equipped with these weapons is to start training there this month. In the Army's view, the Thunderbird system (officially designated "Red Shoes") is a sound one; and as Maj.-Gen. E. D. Howard-Vyse, Director of the Royal Artillery, put it during a Press visit to Manorbier last Friday: "This mobile equipment is designed as an A.A. defence for field forces, to supplement the work of R.A.F. aircraft." He underlined this tactical defensive rôle by stressing that it was hoped the equipment would never be used in the U.K.

As to the operational range of Thunderbird, the Army is unwilling to disclose figures; but considering that light ack-ack reaches up to 5/6,000ft and the heavy takes over from there, the upward range may be estimated. Thunderbird is not only expected to provide artillery protection for troops but also to snatch down the low-level P.R. aircraft. To perform these functions it must be supported by a launching system which receives information and deploys the weapon accordingly within minutes; and at Manorbier the A.A. School (commanded by Brig. C. C. Garthwaite) is confident that it has worked out a routine which can be imparted to artillerymen used to operating guns. Up to now, no new trades have been introduced to operate Thunderbirds. The technique seems to be to have each man performing a relatively uncomplex duty.

Lest this idea of simplification should be misunderstood, however, let it be clearly stated that every effort is made at Manorbier to give trainees a complete picture of the whole system. An elaborate model has been constructed at the School (at a cost of only £58) to show the typical deployment of a Red Shoes SAGW battery. This shows four launchers, and their associated equipment is depicted both in models (on a Dinky Toy scale) and on full-scale control consoles whose lights indicate the actions taken consecutively in the battery area.

There are three organizational divisions in a battery—headquarters troop, servicing troop and firing troop; and these are sub-divided, equipment-wise, into four operational spheres.

Forming the heart of the battery is its command area, comprising the tactical control radar, I.F.F. equipment, T.I. radar and battery command post. There are two launcher areas, identical with one another and each containing a launcher control post, launchers (up to four in number) and launcher loaders. Finally there is the field assembly and test point.

The T.C. radar provides the tactical control officer with an overall picture of the sky around his site and this information is passed to the battery command post for PPI-type (plan position indicator) cathode-ray tube display. This tube also receives information from the I.F.F. equipment; and once an aircraft has been identified as a foe the command post issues its orders by coloured light signals.

The T.I. radar, with its thin pencil-like beam, is then locked onto the selected target and tracks it automatically. In doing so it illuminates the target with radio energy, providing the Thunderbird with radar responses to allow it to home. Firing is done from the launcher control post by the launcher control officer, who fires from the three-ton vehicle which forms the L.C.P. and contains a computer plus a missile console for each launcher. In the demonstration at Manorbier last Friday the coloured lights flicking on the consoles, and the radar displays, were pointed out by W.R.A.C. personnel; but SAGW regiments will not be mixed formations.

Before firing takes place, the crews go back 100 yd to shelters, as protection from the blast of the boost motors. (Where these may fall, after parting from the main body of the missile, is problematical; but the chances of them hitting anyone seem fairly remote and the Army is stoutly convinced that anything coming down from enemy aircraft would be much worse). The enemy range is passed to the control post and to the launcher; permission to fire is given; the firing safety key is turned; and the missiles home automatically on to their target.

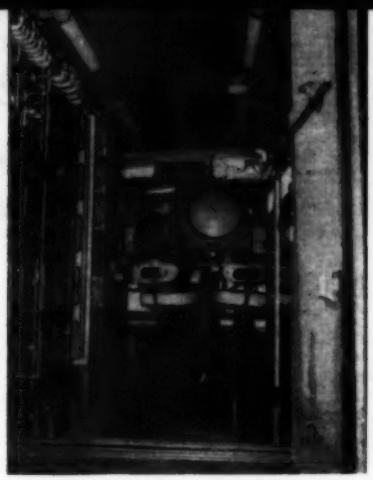
Key members of the battery are trained to fire Thunderbird, which requires highly skilled personnel in its final operational deployment because of its complicated control equipment.

It is estimated by Royal Artillery officers that one Red Shoes regiment can give coverage over a Corps area. The peacetime establishment is to be two batteries per regiment; and the manpower of each regiment will be slightly less than that of a heavy A.A. regiment—i.e. 700.

One of the claims made for the Thunderbird system is its mobility, and at Manorbier it is described as being "at least as mobile as a heavy ack-ack regiment." A limiting factor is the 16-ton weight of the tactical control radar, but it is pointed out that there is a large tolerance in siting this—it doesn't matter where it is to within a mile or two. Ironically, this piece of equipment is a legacy to Thunderbird regiments from the former heavy A.A. units.

The Army has been teaching artillery techniques at Manorbier for over twenty years (Maj-Gen. Howard-Vyse remembers the School starting as a tented camp in 1937); but its Thunderbirds and their associated equipment provide new features on the Pembrokeshire landscape and already the Bofors is being referred to as a "steam gun." (Only conventional artillery, however, is actually fired at the School because of range safety regulations.)

When the model demonstration of the Thunderbird system had been given at Manorbier last Friday there was a roll-past of vehicles showing how many were required to sustain it in the field. These ranged from the missile test bay (for testing missiles coming from a R.E.M.E. workshop) to the mobile launcher, and in between the convoy was mounted as follows: a trailer for



In the mobile role the very powerful tactical radar is mounted on a vehicle. All radar equipment is similarly mounted, and one of the displays is pictured on the right

hydraulic and power supply; three-tonner towing a container for the missile body; three-tonner towing a generator; vehicles for tactical control radar, T.I. radar and battery command post; test vehicle for radar receiver; and vehicles for launcher control post and launcher loader. These form a numerous convoy, and it must continually be a haunting thought in R.A. minds that the knocking-out of only one vehicle could upset the whole operational balance of the system. Where formerly one gun was a self-contained unit, the despatch of missiles is now a complicated electronic process and a Thunderbird battery takes a great deal of moving around. The Royal Artillery, however, seems confident in their ability to sustain in practice the claims for mobility made for Thunderbird by its manufacturers.

At Manorbier, all concerned have been to immense pains in the past five months to learn about the system and to suggest possible modifications, so that when the first regiment comes for training the routines will have been well worked out. These range from assembly and testing to the firing procedures. For training purposes, drill missiles are used; and those officers and N.C.O.s handling them at the School are gunnery instructors who with this indoctrination have become G.W. instructors whose task it will be to train the new regiments. What appears to be an alarming preponderance of staff officers at Manorbier is explained by the fact that all the officer instructors wear red bands round their caps. For N.C.O. instructors, white bands are the rule.

When a missile is received it is subjected to tests to determine its probable behaviour in flight. These tests at present take about half an hour; but it is explained at the School that "things are still being worked out," with the implication that this time may be reduced. After testing is complete the nose cone, fins and wings are fitted; the four boost motors are put into position and latched; and the missile is ready for loading onto its launcher by a special trailer. Loading is an operation requiring great care, and could be especially tricky in poor light or high winds.

Normally this work of assembly and testing will be carried out long before the deployment stage, and the missiles sent forward to replenish a ready use area as required. But for training purposes, the whole sequence of operations is carried out within the same location.

Quite a small detachment of men (six, including two National Servicemen in the demonstration at Manorbier) is needed to bring the missile launcher into action; and in this operation the Army's genius for reducing quite complicated procedures into a comparatively simple drill routine was clearly exemplified. These half-dozen artillerymen, led by a corporal, went through their routine with the precision and swiftness of a turn at the Royal Tournament. Markers are set to indicate the launching site; the base of the launcher is checked to ensure that it is level; the assembled and tested missile arrives from the field assembly test point and is backed onto the launcher; cables are connected bringing power supply from the launch control point; the Thunderbird is elevated hydraulically and the vehicle which brought it sent away for another.

The mobile launcher control post is the focal point of the firing section of a battery, and the launcher control officer supervises the final missile preparation and fires it. The three-ton vehicle from which he works contains a complex lamp order signal system which has already been mentioned in referring to the demonstration model at Manorbier.

In its official description of Thunderbird, the Guided Weapons Wing at the School of Anti-Aircraft Artillery describes it as a "medium to high altitude" SAGW system using the semi-active homing principle, the missile using radar reflectons to home onto its target. Radar, in the older and more limited rôle of tracking a target, is being increasingly used at Manorbier for light A.A. work also.

Manorbier is essentially an instructor-producing unit, and during the summer months acts as host to heavy and light ack-ack units for training. The Director of the R.A., Maj-Gen. Howard-Vyse, said at the conclusion of last week's demonstration that there are still "teething troubles" with the new SAGW system; but the unit is doing its best to carry out its task of training on new equipment as it comes into service.

Close by the site of the School stand the ruins of Manorbier Castle, whose mute walls bear witness to the days when battlements were considered impregnable defences. The Thunderbirds standing on the nearby cliff tops form a sharp contrast to the castle; but rockets are not new as military weapons and the Chinese apparently used some such type of missile about the time Manorbier Castle was built. Not, however, in such an effective form as Thunderbird. This product of English Electric Aviation and associated companies manufacturing the radar equipment, Metropolitan Vickers and B.T.H., has given the Royal Artillery greater range and accuracy than it ever previously possessed in its long military history.

H. W.

A mobile launcher is here installed on the cliff-top at Manorbier. The elevating frame has just been transferred from the transporter

A mixed formation of aircraft from the Empire Test Pilots' School, Farnborough, flown by E.T.P.S. pilots. From left to right, a Swift, Vampire, two-seat Hunter (in the lead), Meteor N.F.11, Meteor 7, Sea Hawk and Hunter

SERVICE AVIATION

Royal Air Forces and Naval Flying News

U.K. - Salisbury Record

A VALIANT of No. 214 Sqn., piloted by S/L. J. H. Garstin, flew from the U.K. to Southern Rhodesia on May 28 in 9 hr 42 min—the fastest time ever achieved for this distance. The aircraft left R.A.F. Marham at 0310, refuelled from a tanker over Idris and reached Salisbury at 1253.

Its average speed for the 5,319 statute miles flight was 545 m.p.h.

Airway Separation

A NEW air traffic control radar unit has been set up at R.A.F. Hack Green, near Nantwich in Cheshire, to guide military aircraft through the civil airways. Hack Green is just outside the Manchester terminal control area and near the junction of Red Three with Amber One. A continuous watch will be kept and R.A.F. pilots wishing to enter the area scanned by Hack Green will have to request prior permission and then be given a track separating them by at least five miles from the nearest civilian aircraft.

Off to Camp

FIRST of the university air squadrons to go on summer camp this year will be Bristol and St. Andrews, who on June 14 leave for Valley and Tangmere respectively, where they will remain until July 12. The other U.A.S. summer camps are as follows: Aberdeen at Hullavington, June 30-July 31; Birmingham at Tangmere, August 25-September 25; Cambridge at Martlesham Heath, June 20-August 1; Durham at Valley, August 24-September 20; Edinburgh at Thorney Island, June 15-July 12; Glasgow at Valley, July 15-August 19; Hull at South Cerney, June 28-July 26; Leeds at Hullavington, August 8-September 5; Liverpool at Thorney Island, August 24-September 30; London at St. Mawgan, June 21-August 2; Manchester at Ouston, August 21-September 19; Nottingham at Thorney Island, July 13-August 9; Oxford at Jurby, June 21-August 2; Queen's University, Belfast, at St. Athan, June 29-July 31; and Southampton at Tangmere, July 5-August 2.

Revisiting Durham

HAVING been born in Sunderland and educated for a short time at its Technical College, the Air Member for Supply and Organization (Air Chief Marshal Sir Walter L. Dawson) was on home ground for his visit to the Durham U.A.S. dinner at R.A.F. Ouston on May 22. In his speech he stressed the value the universities attach to their air squadrons. Two years ago, as Inspector-General of the R.A.F., he had been personally commissioned by the Air Council to visit all the 17 universities which had squadrons, and he had found unanimous support for their retention. Sir Walter stressed the need for a proportion of graduates in the R.A.F. and praised the progress and expansion of Durham University, on whose behalf the Professor of Medicine, Prof. G. A. Smart, replied to Sir Walter's toast.

Other guests welcomed by the squadron commander (S/L. D. L. Eley) included the A.O.C.s of Nos. 13 and 25 Groups (A.V-M.s A. Earle and J. F. Hobler) and the principal of Sunderland Technical College, Dr. D. A. Wrangham, who replied on behalf of the guests. The manager of Airwork Ltd. at Ouston, Mr. G. T. Knox, proposed a toast to the squadron and P/O. W. F. Stonor replied.

Describing the R.A.F.

A FOREWORD by the C.A.S., Marshal of the R.A.F. Sir Dermot Boyle, and up-to-date information on R.A.F. equipment are features of the new (second) edition of John W. R. Taylor's useful booklet *Royal Air Force* (Ian Allan Ltd., Craven House, Hampton Court, Surrey, price 2s 6d). Comprehensively illustrated, including photographs of R.A.F. missiles and of the recently ordered AW.660, the book lists the Commands and their Cs-in-C. and contains a useful historical note on the R.F.C. and the R.A.F.

Two members of the Central Experimental Proving Establishment at Ottawa, which is shortly to start flight trials of the first of ten Napier Eland-powered CL-66s for the R.C.A.F., visiting the Napier works recently. From right to left they are F/L.s J.K. Murray (R.A.A.F.) and A. L. Nelson; and with them are Mr. G. N. Torry, Napier's aviation sales department, and Mr. H. P. Rosewarn, a technician. They are examining one of the few remaining Napier Sabre engines

H.M.S. "Hermes," rebuilt 22,000-ton aircraft carrier, on her first voyage recently — from Barrow-in-Furness to Southampton. Her big radar scanner is clearly visible in this picture

IN BRIEF

The R.A.F. Benevolent Fund has now received £14,624 6s 6d as a result of public support for R.A.F.A. branch activities during Battle of Britain Week last year.

* * *

W/O. R. R. Bird, stationed at R.A.F. Ternhill, has been awarded £25 by the Air Council in accordance with its policy of encouraging ideas that help to improve Service efficiency. This award follows one totalling £37 10s from the C-in-C., 2nd T.A.F., in 1957 and is for a Hunter jet pipe support rig which obviates removing the tail empennage during ground servicing.

Straight and Level

SIR CHARLES BOOST, firebrand chief of Plummet Air Lines, is now quite recovered from his illness brought about by the Government's report on Britain's supersonic airliner programme. Last week, indeed, he felt fit enough to hold a news conference in his Mayfair office.

The Press were told nothing in advance about the meeting—only that "a statement of the utmost importance to the future of our island race" would be made.

After cocktails (choice of gin and HTP or gin and lox), the background music from *"Shock Wave Diamonds"* faded, and a vast curtain drew back to reveal Sir Charles Boost and Sir John Blackout-Jones—chairman of the Super Scruggsdyne Group—seated in tandem astride what looked like a cardboard ICBM with windows.

● After a brief introduction by the P.R.O. of Super Scruggsdyne, Mr. Julian Washbrain (who was dressed as a Beefeater), Sir Charles dismounted and addressed the meeting.

"You may be wondering," he began, "why I was sitting on that rocket with my old friend Blackie here. I will tell you. Plummet and Super Scruggsdyne are joining forces to produce a super British Master Omnibus Rocket—an airliner, ballistic missile and satellite-launcher all in one. It is the only way to prevent us from becoming a second-class nation. We must keep the Union Flag flying high, and this will be the halyard. It will cost a lot of money, a lot of money. But can the Government afford *not* to finance our native genius and inventive brilliance? Gentlemen, there can be only one answer to this question."

● A colleague is still making appreciative remarks about a works tour he made the other week.

It seems that the 150-odd visitors—assorted V.I.P.s and technical journalists—were divided into parties of convenient size, shown the factory from above by helicopter, and then taken inside. On entering each department their guide brought them to a halt before a table bearing a tape-recorder wired to a loudspeaker. Also in evidence were decorations — one floral, the other feminine. The latter started the recorder, which emitted a loud gong noise and launched into a clear and concise description of the plant and process concerned. Simultaneously the departmental head, armed with a pointer, indicated on a large diagram the particular bits being discussed, or held up specimens at the appropriate moments.

Everything was so well described that nobody needed to ask questions, and the party was free to move on to the next block in accordance with a split-second itinerary that eventually brought them to a room in which (I gather) an interesting alcoholic process was being demonstrated.

Resolved that no sordidly commercial note shall sully this column, I refuse to reveal more, except that all this is *re Duxford*.

● I wish the firms *I* visit were always as imaginative. I usually find myself wedged between an acid-bath and a case-hardening furnace, listening to an interminable and mostly inaudible dissertation by an earnest little man who started the department in 1909 ("that was when Sir Charles's father was our chairman, of course").

By the time I catch up with the rest of the party the present Sir Charles is telling his secretary to lock the cocktail cabinet and call the visitors' cars.

● *"Although at least nine foreign airlines have shown an interest in the de Havilland Comet 4 jet airliner only two have so far placed firm orders. There is little indication that any of the others will do so."*—An air correspondent.

I, Roger Bacon, say that there are many indications that more Comet 4s will be sold.

Who's right? Take your pick.

Do any of us *really* know what is in the minds of airlines well enough to make statements like this?

The airlines concerned don't even know their own minds most of the time when it comes to buying new equipment.

● The other week I remarked on the abundance of British police who snooped around the Tu-104 when it visited London Airport on a pre-service proving flight.

A staff-member recently in Russia was surprised to see that there were remarkably few police around Moscow airport—or, for that matter, in the city. Certainly there were no guns to be seen anywhere, as is the case at most airports (even some British Colonial ones, I seem to remember) in the free world.

There were no Customs formalities, except for a form which was filled in on the aircraft. And no one rudely thrust forward a card saying: "Have you read this?" as the Customs gentlemen do at London. There were no irritating E/D (embarkation/disembarkation) cards to be filled in; no airport taxes to be paid; and no one checked names in a sinister-looking black book, which is routine when you enter America. Nor do visitors to Russia have to undergo finger-printing and an interview as are necessary when you apply for a U.S. visa.

Could it be that the free world isn't as free as it thinks it is?

● And what about this for freedom? A *Flight* colleague wanted a Czech visa in ten days. He was told by the Embassy that visas normally take 14 days to obtain. He asked whether the process might perhaps be speeded up. Did it really need to take as long as two weeks?

The Czech diplomat's answer: Does it really need to take as long as six weeks for a Czech to get a British visa?

● A new European air power, Air Union, is born. I hope no one in this country is being complacent about its challenge to our air transport interests. The economic and political strength of Air Union will assuredly make it the most powerful in Europe.

● Two members of the British Air Line Pilots Association were walking past the Alcock and Brown memorial at London Airport.

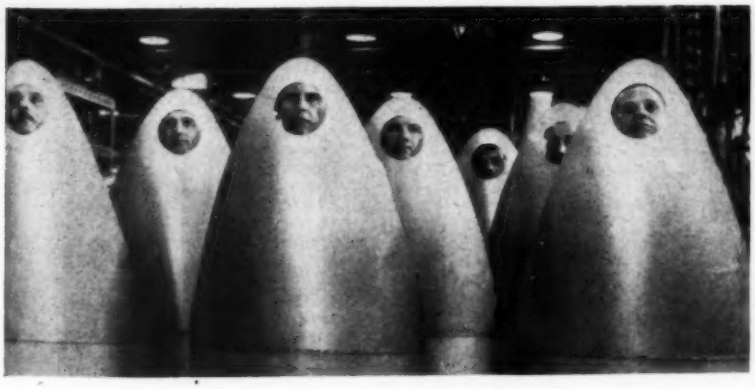
"I hear," said one, "that the American Air Line Pilots Association has asked for that crew to be removed."

"What on earth for?" inquired the other.

"Only two pilots," was the reply.

ROGER BACON

Missile workers demanding another fourpence an hour (or else), as seen from the works manager's desk? No, merely a spiffing jape by some of the lads at the Ryan Aeronautical plant at San Diego, wearing stainless-steel exhaust ducts intended for Douglas C-133 transports



A Window in Moscow

HOW B.E.A. ARE MINDING THEIR BUSINESS IN RUSSIA

By J. M. RAMSDEN

Right, the view from the control tower at Moscow airport, whose staff speak to B.E.A. flights in good English. Note the anti-glare device—a silk curtain with a fringe of lace

SERVICES between London and Moscow by B.E.A. and Aeroflot have now been in full swing for three weeks. What has been B.E.A.'s experience of doing business with the Russians? When Ministers and Marshals have agreed on the broad principles, what are the workaday problems confronting the men on the spot? Here is an account of some of the experiences to-date of B.E.A.'s Moscow staff

IN a quiet corner of the Croydon-sized Moscow airport terminal at Vnukovo is the first British business office to be opened in Russia for 30 years. On the door is a huge poster of two bear-skinned troopers of the Brigade of Guards, and an invitation to fly to London by British European Airways.

Inside you will be warmly greeted by B.E.A.'s manager in Russia, Mr. M. S. Brander, and as likely as not by his wife. Mrs. Brander, when I called, was checking the up-to-dateness of B.E.A.'s voluminous passenger-fares manuals, while the station engineer, Mr. Ken Clarke, was discussing with the manager the measures required to remove dampness from the engineering spares store.

On the far wall is another poster, of the colourful Cathedral of St. Basil in Red Square, and an invitation to fly B.E.A. to Moscow.

The office has been furnished by Aeroflot, and it was ready for the manager to move into when he arrived from England—something he had not experienced (he remarked) on taking up similar postings in other countries. The office appointments, if not exactly in the Dorland House idiom, are perfectly acceptable, comprising a rather grand walnut-inlaid desk with a green-baize top, and a lamp with a bright orange shade; a vast six-abreast, brown studded-leather sofa; three chairs, a bookcase and a table; and—the universal accounting machine in Russia as well as the Orient—an abacus, whose mysteries the manager says he is determined to unravel.

Only one part of the office furnishings was not supplied on time: on the morning of the move-in someone from Aeroflot apparently came rushing in with the ashtrays, apologizing profusely for their lateness.

There is, of course, a telephone, which rang during my visit. Perhaps no B.E.A. commercial secrets will be divulged if I were to disclose parts of the manager's conversation, guaranteed authentic:—

"Yes, Mrs. J—, your cat should be inoculated against distemper. . . . Put it in a basket, get it weighed, and I will ask Aeroflot to bring it down to the airport here. . . . Don't worry, I will signal Copenhagen and make sure that it is well looked after on the way. Make sure the basket is a good strong one. . . . I remember once we opened the hold at Rome to find that a large dog had got out of its box and eaten a consignment of day-old chicks. He was looking very happy. . . . Goodbye, thank you, and don't worry."

The manager gave no sign that this interlude was anything but a normal part of the job—which he finds absorbingly interesting—of managing B.E.A.'s affairs in Russia.

B.E.A. also have an office in the city, where most of their commercial business—as opposed to the operational business for which the airport office is generally used—will be done. The city office is a sumptuously furnished room in the Leningradsky Hotel, near the Kazansky Voxall Railway Station whence the trans-Siberian trains depart. The walls and chairs of this office are brocaded in silk, the chandeliers are of cut glass, the ceiling is of richly moulded plaster, the carpet is thick and Persian, and the cost is not exceptional since it is a part of the manager's private suite. This will be B.E.A.'s city base until the time comes to move into an office nearer the business centre of Moscow. This Aeroflot will provide—just as B.E.A. have set up Aeroflot's representative in London, Mr. Grigori Yarotski, with an office in Dorland House.

Back at the airport, after a 20-mile drive southwestwards along the dead straight Kiev highway (during which the driver of our Pobeda taxi fell disconcertingly asleep), I was shown the third piece of British commercial territory in Russia. This was B.E.A.'s spares store, a partitioned-off section of an old Aeroflot cargo shed at the back of the terminal. This is the direct responsibility of Mr. Ken Clarke, who incidentally wears a uniform—an obviously practical working dress for freedom of movement at an airport where almost everyone is in uniform.

The spares store, which is about the size of a garden shed, was built in three days flat by Aeroflot carpenters and electricians, who obligingly provided cupboards and shelves and holes in the door and lights to Mr. Clarke's specification. It is stocked in accordance with B.E.A.'s Viscount 806 spares schedule, and I noted such items as a spare mainwheel, spare tyres (nose and main), VHF radio, a starter motor, a selection of flight instruments, a wheel jack (with an adaptor nicely turned up on an Aeroflot lathe), de-icing fluid, and (rather oddly, in view of Aeroflot's mighty fleet of charwomen) a cabin vacuum cleaner.

Mr. Clarke was waging a battle against damp; that very day Aeroflot's carpenters had been asked to board over the concrete floor. The representative of Air France, whose spares store adjoins B.E.A.'s, peered in and cordially invited us to inspect the damp which had collected on one of his Super Constellation spare wheels. Professional views on damp-removal measures were exchanged by the engineers, the Air France man advising that "in winter you will need ice skates in here unless you have heat." Mr. Clarke, however, appeared to have matters in hand, and he had also arranged for all inflammable items, such as the de-icing fluid, to be stored in Aeroflot's special store.

"FLIGHT" PHOTOGRAPHS

The language barrier to the prompt fixing of problems like this is, of course, considerable. For this reason the manager has an assistant, Mr. David Rex-Taylor, who speaks Russian and who is also helping with the routine staff work. As soon as possible a Russian girl who speaks English will be engaged through Aeroflot as the manager's secretary.

B.E.A.'s staff depend upon the co-operation of Aeroflot to a very large extent. Few, if any, of the day-to-day problems that arise can be solved except through the good offices, and by the goodwill, of Aeroflot. In essential matters of routine, too, B.E.A. entirely depend—under the terms of the contract between the two airlines—upon the Russian airline.

Take, for example, ticket-selling and promotion. All tickets are sold by the Soviet Government's department of tourism, commonly known as Intourist. I asked whether B.E.A. could feel quite sure—since revenues are apparently not pooled—that bookings are allocated to B.E.A. with scrupulous fairness. "Quite sure" was the firm reply. There had certainly never been any question of Intourist selling Aeroflot in preference to any of the other European airlines who are likewise entirely in Intourist hands.

Aeroflot receive from Intourist the passenger and cargo manifests prior to departure, make out the Viscount load- and trim-sheets, and load the aircraft accordingly. Owing to differences of language and techniques some difficulties have arisen here: when I was there load and trim documents were being done by the B.E.A. manager himself—and on one occasion a hold had to be reloaded as the lashings were not in accordance with Viscount practice. These are typical of the problems which only time and patience and understanding can solve.

At first B.E.A. expected that advertising opportunities in Moscow would be limited, if not non-existent. But I saw in Aeroflot's window in Rasina Street a B.E.A. poster display—and something which I didn't see in the Corporation's Regent Street window when last I passed by: models of the Comet 4B in

the pedestrian-stopping new B.E.A. red-wing colour-scheme.

It has been agreed to erect, probably in Revolution Square, a neon sign exhorting Muscovites to fly Aeroflot/B.E.A. to London. And a hoarding with a similar message may soon appear on the road to Vnukovo airport. Those who knew the Russia of two years ago—even one year ago—are astonished at this acceptance of the commercial practices of the West.

B.E.A. keep in touch with London by the S.I.T.A. teleprinter in the Aeroflot office, and all messages, in and out, are handled by Aeroflot. The story goes that the teleprinter girl, believing that a late-evening message for Mr. Brander was urgent, took the message herself the long journey to his hotel. Sometimes the teleprinter English goes slightly astray: "ARRIVIG CUNDAY SERVIZE," for example.

Fuel used by B.E.A. at Moscow is Russian kerosine to specification TC-1. A sample was analyzed some time ago by Rolls-Royce and B.E.A., and found to correspond acceptably with the normal Dart Avtur fuel to specs. D.E.R.D. 2482 or 2492. TC-1 is the fuel used by all Aeroflot turbine aircraft. Viscount 806 refuelling at Moscow is carried out over-wing. The station engineer always performs the routine bowser-checks before refuelling—namely, checks for water-content, specific gravity, and colour ("the same as vodka").

All cabin-catering at the Moscow end is provided by Aeroflot, and it is of excellent quality, as I can personally testify from the meals served on the return flight.

Some problems have arisen, as might be expected, in monetary rates of exchange. As Sir David Eccles, President of the Board of Trade, knows only too well from his recent trade talks in Moscow, there are three rates of exchange: 11.2 roubles to the £ at the commercial rate; 28 at the tourist rate; and 40 at the diplomatic rate. The scope for taking advantage of these various rates is obviously large for those who have exchanged their pounds at the 28-rouble rate, because airline tickets are sold by Aeroflot in roubles at the commercial exchange rate of 11.2.

This is why, for the time being at any rate, you are required by Intourist to pay for international tickets at 2½ times the published rouble fare. This rule applies also to cargo and to excess baggage. But it does not apply to tickets bought for internal flights in the U.S.S.R.—so that tourists should (as matters stand at the moment) find air travel within the country remarkably cheap.

Loads out of Moscow, at the B.E.A. allowance of about 100 kg per passenger, are limited to 3,200 kg—i.e., about 32 passengers plus baggage. Freight business could develop most promisingly following the U.K.-U.S.S.R. trade agreement—an agreement which incidentally should generate a sizeable passenger business, too. Though forecasts about air traffic growth are notoriously rash, it was the B.E.A. manager's impression that the full capacity of the Comet 4B—which will become available about a year from now—will really be needed.

The Viscount 806 was of course designed for short hauls, average stage length throughout B.E.A.'s network being 230 n.m. Payload limitations on the eastbound flight into Moscow are more severe than they are out of Moscow, being reportedly 2,700 kg—2,800 kg (27-28 passengers).

Left, the richly appointed B.E.A. commercial office in the city and, right, the Corporation's operational office at the airport. In the picture are the manager, Mr. M. S. Brander, and the station engineer, Mr. Ken Clarke. They have a Russian-speaking assistant

Though the potential freight business between the two countries may indeed be promising, it seems unlikely that, until Comet capacity is available, freight opportunities can be fully exploited. Good freight loads can be carried at the moment by Viscount 806s only at the expense of passengers—the more lucrative type of traffic, of whom a good average of 29 per flight will be needed to achieve B.E.A.'s break even load factor of 51 per cent for the route (see "Flight to Moscow," Part 1, May 22).

All the foregoing remarks, incidentally, are personal views only, and are quite unofficial. It should be emphasized that B.E.A. are confident that, during the initial period of the Moscow service, the Viscount 806 is the right-sized aircraft for the job.

The B.E.A. amenities at Moscow—two offices, spares store, the window in the city, and the furnished flat—are, of course, extended to Aeroflot in London on a reciprocal basis. And each airline, as is laid down in many other inter-airline contracts, is general sales agent for the other on its home territory.

* * *

Walking around Moscow I saw a surprising number of American tourists and their wives, and Latin Americans too. How did they travel to Moscow, I wondered? I was not to know—but I know how they ought to travel from now on. And I must say, though I greatly enjoyed my brief stay in Moscow, I found it very pleasant to be enclosed again in 35 tons of Britain. Next year, when Comet 4Bs are in service, there will be 75 tons of Britain calling regularly at Moscow—and only a 3½-hour flight to England.

The B.E.A. Viscount 806 in its new passenger market—Moscow. An Aeroflot Tu-104 can be seen in the circuit

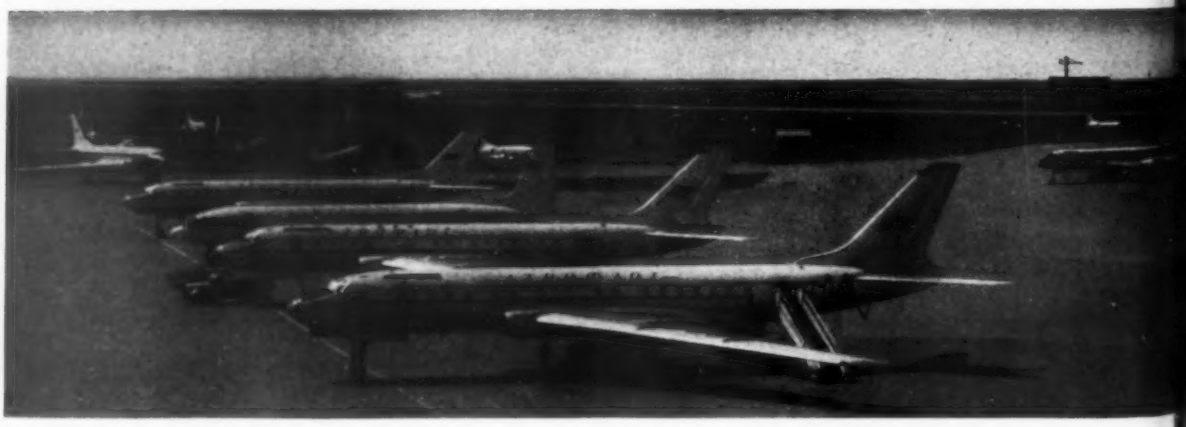
Aeroflot, May 1959

THE GENERAL scenes at Moscow airport above and bottom are the first of their kind ever to be published. They capture, at least to some extent, the scenes of Aeroflot mightiness which so impress all foreign first-time visitors to Vnukovo airport.

Just how large is Aeroflot—or rather the operating part of the U.S.S.R. Civil Air Fleet? In answer to this question *Flight* was told by Mr. Zelenov, Chief of Internal Transportation, that "including local services, Aeroflot last year carried ten million passengers." Another figure, of 15 million passengers, was earlier given to British newspapermen by Marshal Zhigarev.

At least we now have, if only to a very rough order of accuracy, some yardstick by which to measure the size of Soviet civil aviation. The total number of passengers carried by U.S. airlines in 1958 amounted to just over 49 millions. One U.S. airline alone, American, carried more than 7.2 million passengers last year. But

Above is a study of the Il-18's Ivchenko AI-20 (4,000 h.p.) powerplant and AB-68B propellers, and below is a new portrait of the Il-18. At the top and bottom are composite pictures of everyday scenes at Vnukovo airport: about 50 aircraft can be counted in the originals



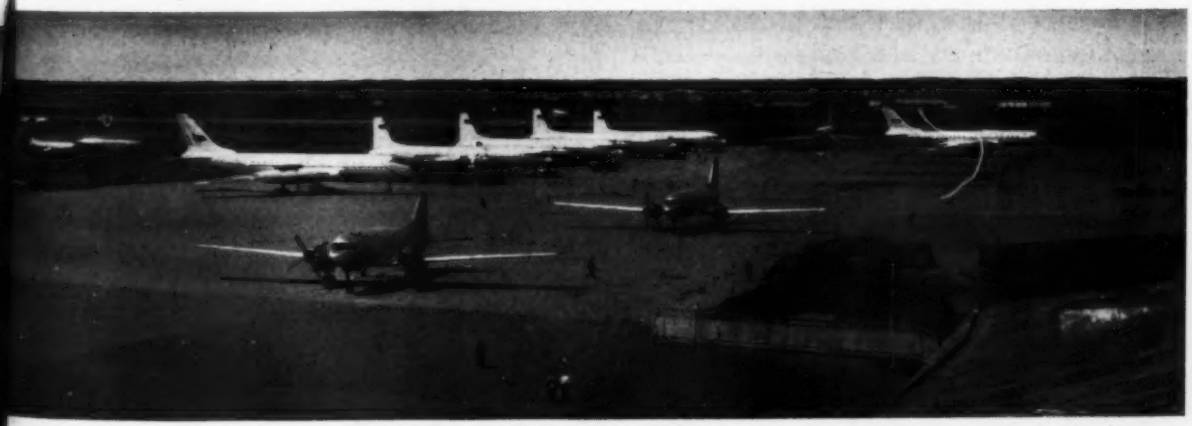
"FLIGHT" PHOTOGRAPHS

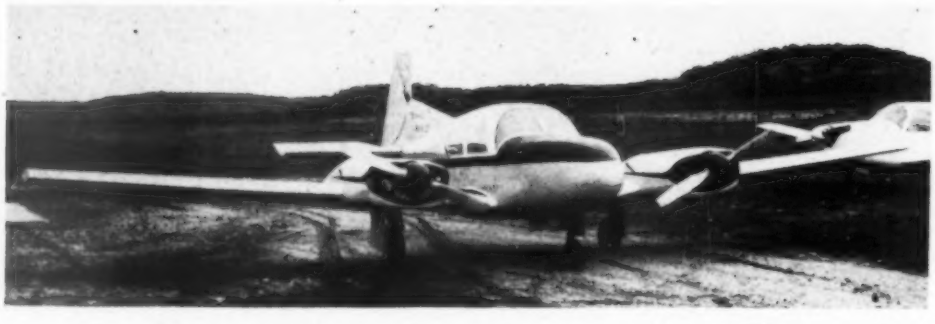
by 1965, the Soviet seven-year-plan requires that Aeroflot shall increase its traffic sixfold.

We have no clue as to the average length of Aeroflot's passenger-haul, so that the passenger-mileage—a more useful measure of size—is unknown. Nor have any figures of freight or mail loads ever been disclosed. It is confirmed that 40 Il-18s are in service, and a reasonable guess at Tu-104 quantities might be "at least 100." There are said to be half-a-dozen Tu-114s flying, and this aircraft is officially scheduled to enter passenger service in September of this year. The An-10 was, Mr. Zelenov said, not yet in passenger service: it is carrying cargo, but passenger services will begin "in the near future—perhaps this year."

According to the same source, the runways at Vnukovo are adequate (see last week's issue) to satisfy the take-off needs of the 400,000 lb-plus Tu-114. J. M. R.

Above are shots of the Il-18's Western-style cabin; of the scene in the Vnukovo terminal; and of the road to the city





Utilizing many components of the single-engined Mk 20A, the new Mooney Mk 22 is powered by two 180 h.p. Lycoming engines. Gross weight is 3,250 lb and a cruising speed of more than 210 m.p.h. is claimed. The prototype shown in the photograph is to be followed in 1960 by series production machines

Sport and Business

AN INTERNATIONAL AIR MEETING organized by the Belgian Royal Aero Club and *Les Sports* is planned for Sunday, July 5, at Gosselies Aerodrome. The major events will include an international aerobatic competition for powered aircraft, and a free-distance sailplane contest for the Victor Boin Trophy. Two British pilots, David Ince in an Olympia 419 and Tony Goodhart in a Bréguet Fauvette, hope to compete in the latter event. Known as the Grand Critérium International Aérien, the Gosselies meeting will also include display participation by U.S., French, British and Belgian military aircraft as well as parachuting and model aircraft flying.

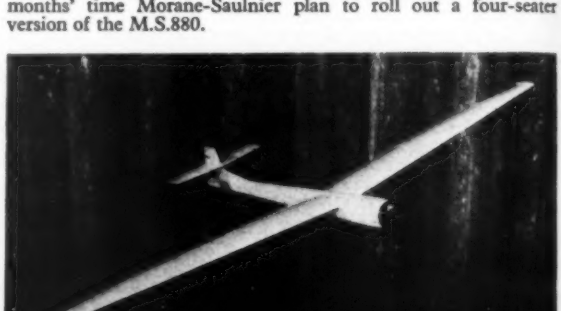
DERBY AIR CENTRE was re-opened last month by Derby Aviation Ltd. with Dennis Stuart as manager and chief flying instructor. Flying training is being carried out on two Austers, and a Chipmunk is expected to be added to the fleet this month. Training at both Derby and Elstree (Derby Aviation is the parent organization also of Elstree Flying Club) is now under the administrative control of David Ogilvy, the Elstree manager. Annual subscription to the new Midlands centre is one guinea.

INCREASED ACTIVITY by the business aircraft owned and operated by a large number of Canadian companies has resulted in the formation of a new organization known as Canadian Business Aircraft Operators. Present membership is mainly concentrated in the Toronto area, but the formation of branches throughout the country is envisaged. The new group is a section of the Canadian Aircraft Owners and Pilots Association, although its operations will be entirely separate. The first national chairman of C.B.A.O. is John R. Martin, chief pilot for Canadian Breweries Ltd., and vice-chairman is W. J. Bradford, chief pilot of McNamara Construction Co. Ltd.

CURRENT SAILPLANE PRICES were quoted by a number of companies at the recent International Glider Trade Fair at Lasham. Slingsby Sailplanes gave the following figures for the firm's present range of aircraft (complete except for instruments), with kit prices in parentheses: T.31b Tandem Tutor, £697 (£458); T.21b, £1,110 (£688); T.45 Swallow, £850 (£495); T.41 Skylark 2b, £997 (£620); T.43 Skylark 3b, £1,240 (£660); and T.42 Eagle, £1,860 (£1,010). The Bréguet 905 Fauvette can be obtained ex works in kit form for £800; complete except for instruments and unpainted, £895; and complete except for instruments, £1,050—all prices subject to import tax and duty. For the range of Polish sailplanes the following prices were quoted C.I.F. London, again not including import tax and duty: Jaskolka, £1,025; Mucha 100, £869; Bocian, £1,386; and Czapla, £910.

A NEW LIGHT AIRCRAFT, the M.S.880, has been announced by the Morane-Saulnier company. A single-engined two-seater intended for private and club use, the 880 is powered by a 90 h.p. Continental engine and is expected to sell at a price under $8,000 (£2,860). The delivery time quoted by the company at present is 14 months, but this should be reduced to four months in about one year's time.

An impressive performance for the new machine is claimed by the company, who state that it will be capable of taking off, climbing to 50ft and landing in only 1,200ft. Cruising speed is 115 m.p.h., maximum speed 134 m.p.h., maximum rate of climb 1,000ft/min and endurance four hours. At a gross weight of 1,280 lb the aircraft carries two people and 45 lb of baggage, and the all-metal airframe is designed to a factor of nine. In 15 to 18 months' time Morane-Saulnier plan to roll out a four-seater version of the M.S.880.



This model of the Bréguet S.10 stratospheric sailplane was shown at the recent International Glider Trade Fair at Lasham. The machine is now approaching completion and should fly for the first time in September. Below is a close-up of the cockpit

Members of Denham Flying Club seen at Kidlington, where they stopped during their recent "operation roundabout" tour of other clubs. Stapleford, Luton and Sywell were also visited. Kneeling on the left is Denham's chief instructor, D. C. G. Wright

Correspondence

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. Names and addresses of writers, not for publication in detail, must in all cases accompany letters.

Pastoral Symphony

THE bouquets bestowed upon certain operators for compliance with "minimum nuisance" operating techniques are obviously somewhat premature. The other evening the peaceful Surrey air was shattered by the passage overhead of a Boeing 707 (emitting four streams of unburnt paraffin). The old cowman who lives opposite to me—he is 85 this year—looked up at the fast-retreating aircraft and remarked:—

"E'm a big beauty, but 'ee don't arf 'um!"

Esher, Surrey. (DR.) J. R. COOPER.

Choice of a Freighter

INSTEAD of evoking general agreement with my theme—that the modern R.A.F. vitally needs a pure-jet strategic-freighter (of 600 m.p.h. calibre) effectively to perform its future function of providing the Army with "aerial fire-engines" rapidly to extinguish globalwise outbreaks—it seems I have erred.

Mr. M. J. Lund complains (May 1) that I omitted to include the Blackburn B.107 as a fourth contender for the Government's recently awarded long-range freighter contract.

I quoted two national newspapers as hinting that the Air Staff preferred a *pure-jet* transport. These papers only referred to three contenders; they were: (1) the Bristol-Short Britannic; (2) the Vickers-Armstrongs VC.10; and (3) the Handley Page 111.

If Mr. Lund asserts the War Office brass-hats' choice was yet another 350 m.p.h. turboprop, I do not disbelieve him. I am only sorry the popular Press omitted to mention the Beverley replacement as a really serious challenger to jet aircraft capable of much higher speed and altitude.

Perhaps our generals would appreciate more slow, low-flying, parachute-dropping aircraft of commodious B.107 capacity. But, I wonder, would they also advise the R.A.F. on how to protect them against even second-rate fighters along a 4,000-mile route over hostile territory?

Surely the axiom is: whoever pays the musician can expect to select the tune. Q.E.D. The new Britannics will be paid for from Air Force budget appropriations, serviced and flown by R.A.F. crews. Mr. Lund does not deny that political expediency may have influenced or over-ruled strategic necessity.

Evading the political issue, Mr. Judd describes a firm capable of producing aircraft to target-date. His colleagues, like everyone else, will, no doubt, temper their "ironic amusement" with a fervent hope that the propeller-driven transports of Brough and Belfast will never be exposed to jet-fighter target practice.

St. Albans, Herts. WILLIAM RICHARDSON.

Altimeter Design

THE considerable correspondence recently in both British and American publications prompts me to contribute some thoughts on the above subject. I find myself in agreement with Mr. A. Davidson [Correspondence, March 6] in that it is indeed difficult to feel enthusiastic about the "interim" design altimeter to be fitted to jet-powered aircraft and that a much more fundamental approach is required.

The problem is that the much-maligned pressure capsule instrument is being asked to do a job which logically splits in two distinct requirements: (a) wide-band coverage to 50,000 or 60,000ft, moderate accuracy only; (b) small coverage, say, 1,000 or 2,000ft, very high accuracy.

Consider (a). This is the instrument referenced for separation and terrain clearance. Given a simple system of scale setting, the pressure altimeter is probably the only answer. The type with sweep hands, including circle pointer for thousands and a short pointer for tens of thousands, seems quite satisfactory. I feel, along with your correspondent Mr. Thompson [February 20], that anyone who is out by 10,000ft reading this type may equally misread other presentations. A suggested deterrent might be an interconnected "Thinx air trumpet" [Roger Bacon's device] suitably mounted close to the driver's ear.

Consider (b). This requirement is for a large-scale, highly accurate instrument for reference during instrument approach or when monitoring an automatic landing in zero visibility. Ignoring the latter horrifying thought, no one can deny that the pressure activated altimeter is stretched to its limit in minima of "200 and ½."

Additional to the absolute limitations of the pressure type are the complications resulting from the number of changes in setting necessary in transition from *en route* to control centre and centre to airfield approach. Plus the fact that at one terminal, over the middle marker, the altimeter will read a height above mean sea level adjusted from a figure given in inches of mercury; whereas at another the pointers may indicate a height above the airfield, the scale set from a given figure in millibars.

Conclusion: (1) A world-wide effort to standardize the type of pressure instrument and its settings for use in maintaining *en route* flight levels and terrain clearance. (2) A specification, which might originate from I.C.A.O., for a height indicator. Here I visualize a type of omni non-ambiguous glide-slope, the beam giving indications to within plus or minus 5ft, of height above the threshold for a range of 20 miles. The prominently displayed indicator to be entirely separate and complementary to any I.L.S. coupled flight system.

Bermuda. H. F. VYVYAN-ROBINSON.

RETROSPECT

From "Flight" of June 5, 1909

The Medura Flyer: A young German inventor who has devised a flying machine of the flapping-wing type, had a somewhat extraordinary experience on the first occasion he attempted to fly . . . He found himself surrounded by a crowd of curious sightseers, which was so extraordinarily dense—in both senses of the term—that he had no room to move without doing damage to his machine, and although he made an attempt to rise in the air, it was not unnaturally a failure. By no means disheartened, Medura is going to try again, and as his worldly position has not endowed him with any great surplus of wealth, it might not be a bad plan if he were to commence operations by "passing round the hat." We know of at least one country, at any rate, where such a proceeding would very effectively clear the field, and that would be something gained in his particular case.

The Pioneer

There's a breathless hush on the range tonight,
A minute to go, and a bird to fly:
A rising wind and a failing light—
Another hold, and Lord knows why. . . .

And it's not for the sake of a Guy Fawkes thrill,
Or the need for Man to prove his thoughts;
But the F.C.O. has a stronger will
("It's me cards for me if this aborts!")

The sand of the range is turning red—
Red with fuel and H.T.P.:
The hatch is jammed and the pipes are bled
("There's nothin' wrong as I can see").
Yet only a scratching sound is heard,
Which *can't* be right in a well-bred bird.

At last the cover yields to guile,
Reveals the monkey in his seat,
Sitting alone with a wistful smile,
And busily writing with his feet.

And it isn't the thought of a fateful flight,
But the range technician's weary stare
That makes the passenger look contrite
And sympathize with the other's care.

Although he hasn't the right to choose,
He looks as sad as a monkey will:
"I'm sorry, old chap, but I pulled a fuse
To give me time to write my will."

Woodford, Cheshire. R. L. H.

[**Glossary:** Bird, guided missile; hold, delay in the countdown; F.C.O., fire-control officer; H.T.P., high-test peroxide.—Ed.]

FORTHCOMING EVENTS

May 30-June 7. Aero Club de l'Ouest: Gliding Championships, Angers.
May 30-June 7. R.A.F.A.: Air Week, Brighton.
June 5. Helicopter Association: "Some Design Aspects of Tandem Rotor Helicopters," by J. D. Sibley and C. H. Jones.
June 5-7. Skegness International Invitation Air Rally, Ingoldmells.
June 6. Helicopter Association: Helicopter Garden Party, Dunsborough Park, Ripley, Surrey.
June 6-7. Florence Aero Club: Rally.
June 6-8. Le Zoute Aviation Club: Rally.
June 7. Royal Netherlands Aero Club: Free Balloon Contest, Etten-Leur.
June 12-21. Paris Aero Show.
June 13. R.N. Air Station Arbroath: At Home.
June 13-14. Flers Aero Club: Normandy Rally.
June 13-14. Glamorgan Flying Club: Rally, Rhoose.
June 15-17. Canadian Aeronautical Institute: a.g.m.
June 17-21. F.A.I.: European Tour.
June 17-27. International Plastics Exhibition and Convention, Olympia, London.
June 20. R.N. Air Station Abbotsinch: At Home.
June 25. R.N. Air Stations Yeovilton and Culdrose: At Home.
Sept. 7-13. S.B.A.C. Display and Exhibition, Farnborough.

THE INDUSTRY

Goodyear/Electro-Hydraulics Agreement

A MANUFACTURING agreement between the Goodyear Tyre and Rubber Co. (Gt. Britain) Ltd., and Electro-Hydraulics Ltd., has been announced, whereby Electro-Hydraulics are to manufacture all Goodyear-designed wheel, brake and associated hydraulic equipment formerly produced at Wallasey.

Goodyear are retaining responsibility for the design, modification and repair of all equipment except hydraulic brake controls, which will be designed and manufactured by Electro-Hydraulics. The Goodyear facilities at Wolverhampton and Hounslow are being expanded to provide increased sales and service in the U.K. and to assist in the company's export sales and service organization. Aircraft-tyre production, which is not affected by the agreement, will continue at the Wolverhampton factory.

D.H. Propellers Appointment

IT is announced that Mr. P. C. F. Morgan has joined the sales department of de Havilland Propellers Ltd. Until recently managing director of Eagle Aircraft Services and a director of Eagle Aviation, and prior to that purchasing manager for B.E.A., Mr. Morgan has joined de Havilland Propellers "to undertake special administration duties connected with all aspects in which the sales department of the company operates."

Instrumental Accuracy

IF the stalling speed of a jet transport aircraft were measured inaccurately to the extent of only 1 per cent above its true value this could, under limited landing conditions, reduce its payload by about 14 per cent—roughly the earning power of the aircraft. This was one of the points made by Sir Aubrey Burke, chairman-elect of the de Havilland Aircraft Co. and president of the S.B.A.C., when he spoke at the annual luncheon of S.I.M.A. (Scientific Instrument Manufacturers' Association of Great Britain) in London recently. Sir Aubrey, who was underlining the aeronautical engineer's insistence on accuracy in instruments, went on to say: "Because of uncertainties in equipment, navigation and weather, airliners must carry big fuel reserves and many land at the end of their journey with their fuel tanks nearly half full. If we could reduce the reserve fuel carried on a transatlantic Comet by using more accurate measuring equipment and an automatic landing system that made certain it could land at its destination in all weather conditions (including dense fog) it could carry 50 per cent more passengers on every trip between London and New York."

Sir Aubrey congratulated members of S.I.M.A. who were concerned with developing blind landing equipment; he said he had made three "completely automatic" landings at the B.L.E.U., Bedford, and had been most impressed.

Spraymat for Sabreliners

PROTECTION against icing on the North American Sabreliner is being afforded by the Spraymat electrical system of surface heating, developed in the U.K. by D. Napier & Son Ltd. and manufactured in the United States by PacAero Engineering Corporation, the sole U.S. licencees.

Spraymat consists of metal conducting elements sandwiched between two layers of epoxy resin, the lower one serving as the bonding agent. In most instances the layers are applied one at a time direct to the structure—a method that makes it possible to protect surfaces with extremely complex contours; but where direct application is impossible, prefabricated heater mats can often be built and applied to the component with equal success.

PacAero are at present undertaking a contract for the application of Spraymat to Lockheed Electra propeller spinners, and by the time it is finished some 840 spinners will have been so treated. The U.S. Navy version of the Electra, the Lockheed P3V, is having its tail unit as well as spinners protected by Spraymat.

Plessey German Subsidiary

A GERMAN company, Plessey Maschinen Elemente Gesellschaft m.b.H., has been formed by Plessey International Ltd. It will be responsible for manufacturing (at Neuss, near Düsseldorf) many products in the light engineering field, particularly those relating to hydraulic equipment. Directors of the new concern are Mr. B. G. W. Attwood, Mr. T. White Wilson, Mr. P. W. Faulkner, Mr. D. G. Booth and Mr. R. Sellies (geschaftsfuhrer).

IN BRIEF

Mr. J. R. T. Bradford, O.B.E., T.D., has been appointed sales manager of British Oxygen Aro Equipment Ltd.

Mr. Herman Baker, for the past six years Far East regional manager for Marconi's Wireless Telegraph Co. Ltd., has been appointed manager of Marconi (South Africa) Ltd.

Mr. R. E. Davis has been appointed sales manager of Petbow Ltd., of Sandwich, Kent. A lieutenant-commander R.N.R., he formerly represented British Insulated Callender's Cables Ltd., in overseas territories.

Mr. E. G. Davidson (right) who has recently taken over as aviation manager of Air BP from Mr. John Sanderson (left). After holding the position for the past 5½ years, Mr. Sanderson has been appointed to the general management of the B.P. Company's associate in Sweden

An admirably produced booklet issued by Technical Designs Ltd., 46 Brook Street, London, W.1, gives examples of the types of work—technical illustration, description, publicity, etc.—in which they have specialized for nearly 30 years.

Paripan Ltd. have formed a subsidiary company, Safety Cleaning Solvents Ltd., to market the American range of cleaning solvents known under the brand-name of Pentone Products. Sales are to be promoted by Mr. A. S. Halls, well known as a commercial pilot; he has had experience with the R.A.F., B.E.A., Airwork and Eagle Aviation.

We regret to record that Mr. Kenneth Brook, A.M.I.Mech.E., an executive director of C.A.V. Ltd., died suddenly on May 16 after a short illness. He joined the company's technical sales staff in 1937 and in 1940 was made chief diesel engineer. During the war he was concerned largely with the cold starting of diesel engines and with the development of fuel systems for gas turbines and petrol injection engines. In 1948 he went to the gas turbine division of the Joseph Lucas organization at Birmingham to continue the design and development of fuel systems for gas turbines, returning to C.A.V. Ltd. in 1953.

A.V-M. A. F. Hutton, C.B., C.B.E., D.F.C., B.A., D.I.C., M.I.Mech.E., F.R.Ae.S., formerly Director-General of Engineering at Air Ministry, who, following his retirement from the R.A.F., has joined Negretti and Zambra Ltd. in an advisory and consultative capacity. He will be principally concerned with the company's products associated with the fields of aircraft engineering and guided missiles

Technograph Printed Circuits Ltd. and Technograph Electronic Products Ltd. have moved into larger offices—including a showroom—at Eros House, 29-31 Regent Street, London, S.W.1 (REGent 5273/5).

Air Trainers Link Ltd. announce that Mr. Norman Hill, who recently joined them as head of the sales division on the resignation of Mr. L. Malec, has been appointed a director; and that Mr. D. P. Markham, formerly chief instrument engineer of Matthew Hall & Co. Ltd., has been made head of the industrial products division.

S.834, a new adhesive for bonding natural and synthetic foams, is now available from the Dunlop Rubber Co. Stated to be suitable for use in upholstering (with aircraft interiors among its applications), it is a white compound of plasticized synthetic rubbers of non-toxic solvents. Further details are obtainable from the company's Compositions Division, Chester Road, Birmingham.

Special synthetic rubber compounds for resistance to Skydrol hydraulic fluids have been developed by Precision Rubbers Ltd. of Bagworth, Leicester, at the request of Monsanto Chemicals Ltd. "O" ring seals produced from these compounds were submitted and as a result of tests carried out by Douglas Aircraft it has been confirmed that Precision Rubbers' grade X.213X is recommended for use with Skydrol 500. Further grades are at present undergoing tests.

Standard Telephones and Cables Ltd. have published a book, *The Story of S.T.C., 1883-1958*, to mark their 75th anniversary. It tells in text and picture form the story of the company from the days of J. E. Kingsbury to Zeta and Dounreay. A section on airborne radio compares equipment in the 1930s with modern installations like ILS, TACAN and the commutated antenna direction-finding system (CADF) which tracked the first Russian satellite in 1957.

AIR COMMERCE

SKYWAYS AND THE AVRO 748 . . .

A LETTER-OF-INTENT to purchase a number of Avro 748s has been signed by Mr. Eric Rylands, managing director of Skyways. This is the first positive interest in Avro's new airliner to be publicly disclosed. The number involved is understood to be about four; delivery should be towards the end of 1960, for service in the summer season of 1961.

Skyways hope to use the 748 to replace 32/36-seater DC-3s on Coach Air services between Lympne and points in France (Paris, Beauvais, Lyon-Nice, Vichy). The 748 seats 36-40, and is considered by Skyways to be an aircraft "ideally suited" to the expanding pattern of Coach Air routes, even though, unlike its Dart Herald and Friendship competitors, it has yet to fly. The first 748 is due to make its maiden flight next February. More details about it will be announced at the Paris Show next week.

. . . AND B.O.A.C.'S CONSTELLATIONS

THE disposal by B.O.A.C. of four Constellation 749s to Skyways means that the Corporation has now sold all 16 of these retired veterans—no mean feat in these days of hard-to-sell used airliners.

Skyways will use 749s to replace Hermes on the London - Singapore freight service operated on behalf of B.O.A.C. The contract provides for maintenance by B.O.A.C. and conversion of the aircraft by the Corporation's engineering department to double-door loading—arrangements for new work which should not displease the airport unions. Value of the contract has not been announced.

EUROPAIR BECOMES AIRUNION

ALTHOUGH the dream of a unified air transport system for Europe now remains almost as far from realization as ever, the amalgamation of the five carriers from the six Common Market countries—and coining of the name Europair—was envisaged by its protagonists as the first step in a wider integration of European air transport. But patently the consortium of Air France, Sabena, Lufthansa and Alitalia cannot justify representation as the "European airline" and, as announced last week by Mr. Max Hymans, president of Air France, and the presidents or chairmen of the other companies within the combine, the name has been changed to Airunion, with the intention to "keep open for the adherence of other airlines, possibly from outside Europe."

The contributions each company will make to Airunion are based on the long-term expansion of the union's business, and will be finally realized only when a fivefold expansion has been achieved (say, by 1970 or 1975). Then Air France (including U.A.T. and T.A.I.) will have a quota of 34 per cent compared with a 1958 share of about 50 per cent; Sabena (and Sobelair) a 10 per cent share compared with 14.7 per cent and Lufthansa 30 per cent compared with 17.4 per cent. Without knowing in detail the routes to which union pooling will apply (North and South America and Europe are certainly to be included) these shares do not accurately reflect the growth rate of each airline; that Deutsche Lufthansa's domestic routes are to come within the pool has already been stated, but Sabena's routes within the Congo, for example, are not to be included, although traffic between Belgium and Africa will be pooled but will not be included within the airline's quota. Similarly traffic between France and French African territories will not be pooled, but will exclude competition from Airunion member airlines.

In any case, the quotas allow for the increased competition that the volatile growth of Alitalia and Lufthansa would in any case have offered to Air France and Sabena, and which had the foreseeable effect of reducing the latter's share of traffic on competitive routes. Nevertheless, to have arrived at such agreement is something of a triumph for the four airlines' negotiators, since it was over a disagreement on quotas that K.L.M. withdrew.

When Airunion comes into force on April 1, 1960, the Union insignia will appear on each aircraft in addition to the existing markings of the national airline. Commercial and sales departments are to be pooled, and profits will be redistributed to the members on a fixed quota basis, probably the numbers of seat miles made available to Airunion by each airline.

The Duke of Edinburgh visited the B.O.A.C. and B.E.A. bases at London Airport on May 29. Here he is seen disembarking from a Britannia undergoing a check in the B.O.A.C. base

GREATER MARGINS WANTED

CONCERN is being expressed by the International Federation of Airline Pilots Associations that performance standards which are likely to be provisionally agreed at the next I.C.A.O. airworthiness committee in July leave something to be desired. In recent years the pilots have come to feel that the existing take-off and landing distance requirements are barely adequate (they are laid down under the I.C.A.O. "acceptable means of compliance" with the existing performance code procedure) and that those to be put forward as proposals in July are less stringent than A.M.C.s in force at present.

Their argument is that even with a rationally based performance code it is still extremely difficult to assess safety levels; it is essential that conservative margins should be adopted for those requirements over which doubt exists. Because "final responsibility for the safety of an aeroplane and its passengers rests with the pilot-in-command," the Federation intends to press I.C.A.O. very hard for an increase in take-off and landing safety margins. Flight-path climb-gradients, for which provisional A.M.C.s are also to be formulated, are to be accepted by the Federation on a trial basis. Some are thought to be inadequate, but these could be amended if achieved safety levels are too low.

MR. DREYFUSS IN LONDON

ON his way back to New York from holiday in Spain, Henry Dreyfuss, the renowned American industrial designer, gave *Flight* his views on the problems of styling the interiors of modern airliners. For more than 30 years, he said, he had been associated with this field of design. In the earliest days he had looked forward to the time when transport aircraft would be large enough to permit appointments to be truly luxurious. But airlines had merely packed in additional sardines, and it was becoming increas-

The first of B.O.A.C.'s 15 Boeing 707-420s, Rolls-Royce Conway-powered, making its maiden flight from Renton on May 19. The Intercontinental 707, JT4-powered, hit the headlines on May 29 with a 5,800-mile route-proving flight from Seattle to Rome in 11 hr 6 min—the longest non-stop jet airliner flight to date. Flown by Tex Johnston, with Mr. William Allen among the 40 on board, it returned via Frankfurt, Brussels, Paris and London. The type will enter service with PanAm in August or September, with delivery next month

B.E.A.'s helicopter experimental unit—this is one of their Whirlwinds fitted with a Corporation-designed plastic spray boom—is to spray 20,000 acres in Fifeshire during June and July. One Whirlwind can earn 45s an acre and cover 100 acres an hour

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ingly difficult to provide proper leg room (except in the aisle seats), while finding room for the numbers of passengers which operators considered economic. One of his current tasks was to design an interior for the Lockheed Jetstar. In this project he had to achieve a standard of luxury, in the small interior of a 6/10-passenger transport, compatible with that expected by the purchasers of this million-dollar machine.

Before long the talk turned to the even greater problem of styling the supersonic transports of the future. The engineers, said Mr. Dreyfuss, did not seem to mind how long such aircraft became, so long as frontal area was minimized. He himself had seen several two-abreast layouts, and it could be that passengers might be asked to sit facing inwards; this would certainly provide adequate leg room, but at the expense of privacy and tradition. It was natural that the airframe designer should be anxious to dispense with windows. One method of approach was to determine the degree of comfort necessary for a flight of not greater than two hours' duration, and it might well be that the claustrophobic effect of a windowless interior could be counteracted satisfactorily by fitting a TV screen in front of each passenger.

His own company had extensive experience in providing moving-picture displays for passengers. After experimenting with periscopic vision (soon discarded, owing to the weight of the Lucite prism needed) the Dreyfuss organization had installed numerous TV sets in executive aircraft (including President Eisenhower's *Columbine*). Unfortunately, a supersonic transport would pass out of range of a ground TV station in a minute or two, and the best solution appeared to be to carry pre-recorded shows on tape. At this point Mr. Dreyfuss mentioned a fist-fight which had once occurred on the 20th Century Limited train, between two passengers who respectively wanted to watch a musical and a boxing match. In any case, he said, an even greater problem—and one not amenable to amelioration by the industrial designer—was that many passengers might be deterred from flying in such aircraft by their external appearance.

Assuming a block-time of two hours—which might be achieved on the Atlantic—it could well be that each airliner might be used ten times in a single day. This posed severe strain on the internal furnishings, and might accelerate the development of improved fabrics. There was, he said, an incessant battle between technological development (leading to higher flight speeds) and the contrary approach of increased luxury. He cited the case of T.W.A., who, confronted by jet competition, took out a number of seats from their Super-G Constellations, and found that their load factors increased substantially. In any case, he said, improved systems of communications, such as a visual telephone, might mean potential air travellers would stay at home and press buttons. Only 75 years ago there were but 24 telephones on Manhattan Island; and who could say how many visual communications systems there would be 75 years hence?

Industrial designer Mr. Henry Dreyfuss (second from right) with (l. to r.) Mr. D. Bunce, Mr. S. Whitcombe and Mr. Patrick Dolan of advertising agents Dolan, Ducker, Whitcombe and Stewart Ltd. (See above)

PRESSURIZED AGUSTA

THE Italian firm of Construzioni Aeronautiche Giovanni Agusta have announced a slightly larger and pressurized version of the Alvis Leonides-powered A-Z-8, with 30 seats in place of the 22-26 seats of the unpressurized version.

A longer fuselage of increased width distinguishes the pressurized aircraft, with a passenger entry door to port at the rear of the passenger compartment; aft of this is a triple seat unit, while the remaining seats are arranged in rows of double units to port and single seats to starboard, each with its own window. In this arrangement the window in the passenger entry door has been dispensed with. The degree of pressurization is moderate, providing a 5,000ft cabin altitude at 16,500ft. Airframe construction is conventional and follows previous practice, a noteworthy feature being fuselage stringers of special section which are attached to the frames and bulkheads and to the skin.

As might be expected, take-off and climb performance has suffered slightly as a result of the increased size and weight, especially as the gross weight has not been limited at the expense of payload, which remains constant at 9,470 lb; but the cruising speed has been increased by 9 m.p.h. A brief comparison of the two aircraft appears below, with figures for the unpressurized A-Z-8 in parentheses:—

Dimensions: Span, 85.96ft (83.66); length, 66.80ft (63.78); overall height, 21.72ft (21.65); wing area, 743 sq ft (719); cabin length, 32.8ft (32.15); cabin height, 6.23ft (6.23).

Weights: All-up, 26,450 lb (24,900); empty, 16,980 lb (15,430); payload, 9,470 lb (9,470); wing loading, 35.6 lb/sq ft (34.6); power loading, 11.0 lb/b.h.p. (10.4).

Performance: Cruise speed at cruise altitude, 233 m.p.h. (224); service ceiling, 26,600ft (27,900); service ceiling on three engines, 20,300ft (21,000); rate of climb at S.L., 1,135ft/min (1,250); at 9,350ft 1,015ft/min (1,115); take-off (all engines operating), 1,245ft (1,150); distance to 50ft, 1,840ft (1,740).

AT SCHIPHOL LAST YEAR

THE Dutch are proud of their international airport; they see it as a symbol of their strength and position in international air commerce, just as the port of Rotterdam represents their influence in the world of merchant shipping.

The business of Schiphol is conducted by the Airport Authority (N.V. Luchthaven Schiphol), a body formed last year with the State and the municipalities of Amsterdam and Rotterdam as shareholders. Their first annual report—comprehensive to a fault—contains a statistical summary of the airport's traffic and transport in 1958, with a detailed review of Schiphol's activities on the ground.

In 1958 scheduled traffic at the airport accounted for 37,162 movements out of 42,543—a total to which K.L.M.'s scheduled and non-scheduled traffic contributed 62.1 per cent of all arrivals and departures. The amount of freight carried increased steadily after an initial decline, and by October—when 6,680,000 lb were uplifted—1957 records were being broken to put the total for the year up by 5 per cent to over 68m lb—a volume that makes Schiphol third to London and Paris in the quantity of freight handled. Operational highlights of the year were the start of services to Moscow by K.L.M. and Aeroflot in July and the re-opening of services to Prague.

On the ground the year's most important project was the start of work on the new 10,800ft runway, which should be complete when K.L.M. receives its first DC-8s in January next year. This has meant the re-settlement of the inhabitants of Rijk, a hamlet of 64 houses. The main instrument runway has been equipped with Sylvania flashing lights and a considerable building programme has been embarked upon. This includes an extension of the international departure section of the terminal building (which now includes a tax-free shop) new offices for Martin's Air Charter and new offices and a large aero-engine overhaul shop for K.L.M. The buildings erected for the Atom Exhibition of 1957 were designed so that they could later be adapted for more permanent use; last year they were converted into the "Anthony Fokker" light aircraft hangar, and the Netherlands National Aeronautical Museum, logically situated at the country's international airport, to which some 1½m sightseers come every year.

1958: THE U.S. FINANCIAL RECORD

AMERICAN airlines carry well over half of the world's total air traffic. For this reason alone the *Air Transport Facts and Figures* published annually by the Air Transport Association of America is an invaluable guide to the financial fortunes of the airline industry.

It is hardly surprising that a picture of confusion is described in this twentieth edition of *Facts and Figures*, which has been brought up to date by the inclusion of data for 1958. The U.S. airline industry as a whole carried more traffic last year than ever before, total load ton-miles exceeding 4,000 million. But this figure was only 2 per cent above the one for 1957; indeed for the first half of the year traffic was running below the previous year's level. Passenger traffic rose by only 1 per cent; freight actually fell by a similar percentage. Faced by the recession in scheduled traffic the U.S. airlines took energetic steps to exploit the charter market—traffic in this field increasing by no less than 21 per cent.

Two particular markets felt the brunt of the recession. The volume of first-class traffic fell as large numbers of less well-heeled passengers abandoned first-class travel and flew coach-class instead. Traffic was also reduced on the short- and medium-stages, particularly those between New England and Florida.

Despite these setbacks, the profit level for the whole industry rose slightly. This improvement was due entirely to the fare increases approved by the C.A.B. early in the year, these increases having more than compensated for a fall in the volume of higher rated traffic and for a slight rise in the average level of operating costs. Yet by any standards a net profit of $53 million must be considered inadequate on revenues exceeding $2,200 million.

The most prominent feature on the cost side of the picture is the way in which average unit costs for the U.S. industry have stabilized over the past three years. An all-time low was reached in 1955, but the following year saw a slight rise and the subsequent level has remained at 29 cents per c.t.m. (4 cents per seat-mile). Different groups of airlines have varied in their experiences. The domestic trunk airlines (which account for about two-thirds of the total U.S. effort) and the short-haul local service carriers have suffered from gently rising cost levels, their respective unit costs now standing at 27 and 50 cents per c.t.m. The overseas carriers, on the other hand, continue to enjoy a falling cost level, and last year managed to push their average unit costs slightly below the 35 cent mark. For all groups of airlines, expenditure on maintenance and flying operations (excluding depreciation) accounts for about one-half of total costs. But whereas the domestic trunk and overseas carriers allocate 10 per cent of their total expenditure to cover depreciation, the local service airlines—still largely using fully depreciated DC-3s—only allocate 5 per cent to depreciation, this low charge being balanced by the proportionately high amount that these short-haul carriers spend on ground services.

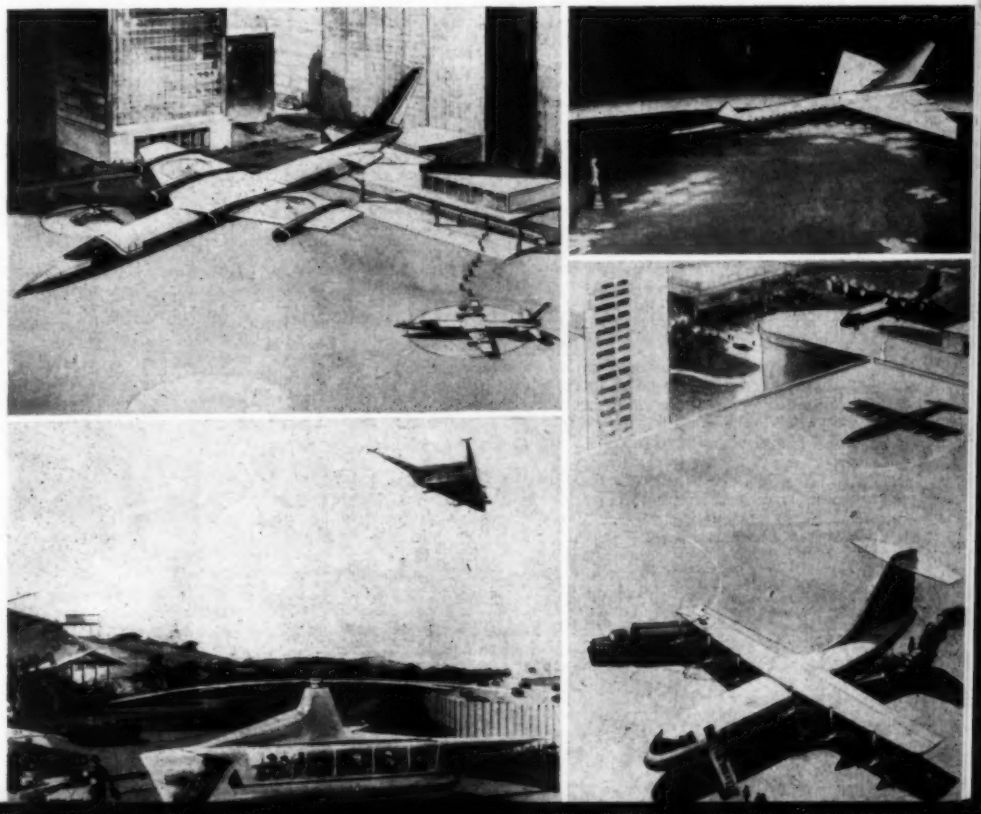
It is on the revenue side of the picture that improvement was usually to be found. Fare reductions and low load factors had dragged average revenue per c.t.m. for the whole industry down to 30 cents in 1957. Although the overall load factor was unchanged last year at 56 per cent, the provisional fare increase resulted in the average revenue rate rising to 31 cents per c.t.m. This narrow change made all the difference between profit and loss.

Once again the various groups varied in their experience. The domestic trunk carriers and local service airlines conformed to the general picture: load factors were more or less unchanged (at 53 and 46 per cent respectively) but revenue rates rose appreciably. The domestic trunks received an average of 55 cents for each load ton-mile carried, the corresponding figure for the local service carriers being about 110 cents (subsidy accounted for about one-third of this latter figure). The overseas airlines, however, continued to face falling revenue rates. The advent of economy-class services on the North Atlantic, and the expansion of tourist-class services on other routes, led to a reduction in average fares which was accompanied by a fall in load factor. This had the effect of reducing profitability on overseas services to an alarmingly low figure. International carriers in the U.S.—with an average cost level of 35 cents per c.t.m.—only just managed to break even. It is, therefore, hardly surprising that their international rivals abroad—with equivalent unit costs averaging about 45 cents—usually suffered serious losses. Last year showed that only the powerful American airlines can weather over-competition in the intercontinental market.

A particular source of strength for the U.S. overseas airlines has been the intensive use to which their capital resources have been put. These companies have regularly managed to earn revenues that have been about double the amounts of capital employed. By comparison, the domestic trunk carriers have managed to turn over their capital only about 1.2 times annually. (Few European airlines are able to turn their capital over once a year.)

The financial relief experienced in the American airline industry last year is, alas, likely to be short-lived. The economics of the first generation of jets do not appear to be sufficiently favourable to permit a reduction in the present level of unit costs. Furthermore, the scale of re-equipment has been such that average load-factors are expected to fall. The only remaining salvation must lie in a more enlightened fares policy. Airlines and regulatory bodies would be well advised to study Professor Cherington's recent work—*Airline Price Policy*—and to investigate those areas where fares could be raised and those where lower fares are indicated.

J. C. S.



These artists' impressions depict Lockheed's transport ideas for the nineteen-sixties. A 2,000 m.p.h. 80-seat North Atlantic airliner (top right) propelled by chemical fuel would be supplemented by (top left) a "roof-top airliner" with turbofan engines driving ducted fans and providing jet thrust. Another idea (bottom right) is a 40/50-seat commuter type with six turboprop engines. The remaining picture shows a "limocopter" for commuting in cities and suburbs

A king, a prince and a queen—and the Crown of England—appear in this recent picture of the Shah of Persia, Prince Bernhard and Queen Juliana about to embark in a T.A.A. Fokker Friendship for a flight from Schiphol to Leeuwarden-Friesland and back. The royal party were the guests of the Fokker company; the Shah flew the aircraft

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UP-TO-DATE WITH THE VANGUARD

A RECENT *Flight* visit to Weybridge provided news of progress with the Vickers Vanguard, B.E.A.-delivery target-date for which still stands at March 1, 1960, despite the delay of 1½ months (caused by Tyne teething-troubles) to the start of the flight-test programme.

The first aircraft is about to fly again after its first major check, having done just over 119 hr in 52 flights, and it will continue a general survey of performance and handling, with initial emphasis on controls. The second aircraft, fully instrumented like the first, had done about 40 hours in 30 flights at the latest count. Vickers' original rough-and-ready yardstick of progress was 1 hr of Vanguard-flying per day from December 1, 1958, to December 31, 1959; this rate has been exceeded.

A small dorsal fin has appeared on the first aircraft and is being incorporated on the production line; it is intended to avoid the marginal possibility of a pilot applying more yaw than could be handled. Also, vortex generators have been applied to the top surface of the wing to improve control in the rolling plane; the possibility of increasing tab power is being examined also.

The third Vanguard is due to fly in two or three weeks' time: less comprehensively instrumented than the first two (whose cabins look like electronic laboratories), it will be the aircraft allocated to 150 hr of tropical trials and high-airport tests, due to start in September at Khartoum or Kano and at Johannesburg or Nairobi. Other progress-notes:—

(1) Propeller strain-gauging will be carried out on two propellers on the same side. (2) Tyne-Lincoln will clear wet-icing properties of the engine; a dry-ice ("Britannia-ice") test has also to be demonstrated to the A.R.B.—though not to the F.A.A. as yet. (3) Airframe de-icing: wing will be cleared from Viscount experience on the basis of estimates and tail from Napier Spraymat tests on a test-Viscount's fin. (4) Actual certification hours will be 1,290, including 250 hours' route-flying, with "all information necessary for documentation" being expected by the end of December. (5) Cold-weather trials will be carried out in Canada. (6) A Vanguard has only once landed unserviceable, and there have been no electrical troubles whatsoever. (7) Ten pilots have flown the aircraft without criticism. (8) Quotes from conversation with Vickers test pilot Capt. R. Rymer: "Delightful and simple to land—you step away from a greaser every time. . . ." "Everything happens so majestically and slowly you have to keep looking at the clock to see that you're really doing 125 kt. . . ." "She will do a balked landing from touchdown with a 25 lb stick-force. . . ." "She flies just like the heavier Viscounts, better in pitch and on trim changes with power and flap." (9) The Tyne 11 should enter service at 600 hr.

VISCOUNT FAMILY MEETING

ABOUT fifty engineers from many different countries with one particular interest in common—the Vickers Viscount—met at Weybridge on May 26 and 27. The occasion was the seventh Viscount Operators' Meeting. This family gathering, unique in the industry, has been an annual event since 1954. The agenda, as *Flight* said when describing the aims and objects of these meetings in the issue of June 6, 1958, "is the corporate snag-sheet of [49] operators whose engineers live and work with the aircraft in almost every kind of operational environment." Mr. A. H. Greenwood, deputy general manager of Vickers, said when he opened the recent meeting: "From now on we will talk about only the things that are *wrong* with the Viscount."

The form of the meeting this year was rather different from those held previously. In place of a question-and-answer agenda which in the past formed the basis of discussion, talks were given by Vickers, Rolls-Royce and Rotol representatives on selected items which appeared to be of the most interest. There were discussions, of course; and throughout the three-day session the customers were free to discuss any problems with the appropriate specialist.

On the third day representatives were invited to study the engineering of the Vanguard, an opportunity which *Flight* also took. It is hoped to report on this in a later issue.

BREVITIES

The last service by a Stratocruiser in B.O.A.C. colours was flown on May 31, between Accra and London.

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More than 100,000 passengers have now been carried by New York Airways' Vertol 44s after less than a year in service.

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The Caravelle has been demonstrated in Moscow during the visit of the French F.A.I. delegation to the Soviet capital. Caravelles may be used on Air France services to Moscow at the end of October.

* * *

Northwest's v-p. operations, Mr. Frank Judd, has said that the unit cost—borne by Lockheed—of rectifying the Electra's vibration troubles will be $2.4m [*sic*]. The work involves tilting the nacelles 3 deg and changing propeller-blade angles.

* * *

B.O.A.C., South African Airways, Central African Airways and East African Airways agreed at their half-yearly discussion in South Africa to press for the introduction of economy-class fares on U.K. - South African services by April 1, 1960.

* * *

The M.T.C.A.'s operational trials of low-frequency radiotele-typewriter broadcasts of meteorological information for the North Atlantic region are to continue. They have been in progress since April 1 and are said to be promising. Transmission is on 121.6 kc/s at a radiated power of 1.5 kW.

* * *

A party of three from the Russian Civil Aviation Workers' Union arrived in London by air on May 30 from Moscow for a two-week tour of British industrial plants and aircraft production lines. The party, led by Mr. A. N. Leontiev, general secretary of the 220,000-strong union, was met at London Airport by a welcoming committee from the Association of Supervisory Staffs and Technicians, headed by Mr. C. Jenkins, the Association's national officer. Mr. Jenkins said that the party would visit Vickers at Weybridge to see Viscounts on the assembly lines. A delegation from ASSET was invited to Moscow last year.

Aerolineas Argentinas Comet 4 services between Buenos Aires and New York are to start on June 7.

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The runway at Lisbon is to be extended to 12,400ft, with a possible further extension to 14,100ft.

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B.O.A.C.'s airways terminal near Victoria Station, London, is to be extended at a cost of £1m. Electronic reservation and ticket-issuing equipment will be installed.

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A B.O.A.C. Comet 4 will be used to fly the Queen and the Duke of Edinburgh to Canada on June 18 at the start of their forthcoming visit. A landing will be made at Torbay, Newfoundland.

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de Havilland Aircraft are unable to confirm reports that Compania Mexicana de Aviacion have placed an order for three Comet 4s, valued with spares at more than £4m. Representatives of the airline announced this at London Airport after a visit to London.

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Following reports that de Havilland Aircraft were to cease building Comets because of lack of orders, the company has issued a denial stating that, in fact, prospects have shown distinct signs of improvement with "the growing realization that a moderate-sized jet is urgently needed to avoid the cream of the traffic going to those carriers which already possess jets."

* * *

On May 29 Silver City carried its 250,000th car across the Channel, from Ferryfield to Le Touquet. The car owner was presented by Mr. H. C. Kennard (Silver City joint managing director) with a cheque equivalent to the return fares for himself and his family and car. Since 1948, when Channel flights started, 856,900 passengers and 71,180 motor cycles have also been carried, and there have been 146,000 flights. The airline have announced that services to Deauville reopen on June 1 and will be operated until September 21.

ZENOVIA